

STANDARD PLANS
FOR STORMWATER QUALITY BASINS
RESOLUTION NO. 21-052
May 2021

ADDENDA TO
STANDARD PLANS
FOR COUNTY OF ORANGE
ORANGE COUNTY PUBLIC WORKS DEPARTMENT
RESOLUTION NO. 18-097

STANDARD PLANS 1901 THROUGH 1918

STANDARD PLANS FOR COUNTY OF ORANGE
ORANGE COUNTY PUBLIC WORKS DEPARTMENT

COPIES OF STANDARD PLANS FOR COUNTY OF ORANGE
ORANGE COUNTY PUBLIC WORKS DEPARTMENT
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http://ocpublicworks.com/about/oc_public_works_standard_plans

ORANGE COUNTY PUBLIC WORKS
601 N. ROSS STREET, SANTA ANA, CA 92702-4048
(714) 667-9780

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OCPW STANDARD PLANS 1901-1918

Stormwater Quality Basins

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1. THE STANDARD PLANS FOR STORMWATER QUALITY BASINS CONTAINED HEREIN SECTION 1900 PROVIDE STANDARD DESIGN DETAILS AND SPECIFICATIONS FOR ENGINEERS, WHO ARE EXPECTED TO EXERCISE SOUND JUDGEMENT PERTAINING TO THEIR APPLICATION WHEN DESIGNING AND IMPLEMENTING STORMWATER QUALITY (AND HYDROMODIFICATION) BASINS WITHIN ORANGE COUNTY. THESE STANDARD PLANS AND SPECIFICATIONS HEREIN ARE INTENDED TO NEITHER BE USED AS, NOR TO ESTABLISH LEGAL STANDARDS FOR THESE FUNCTIONS.
2. THE COUNTY OF ORANGE AND THE ORANGE COUNTY FLOOD CONTROL DISTRICT (COUNTY) ASSUMES NO RESPONSIBILITY FOR THE DESIGN OF FACILITIES ADHERING TO THE STANDARD PLANS CONTAINED HEREIN. REVIEW AND APPROVAL OF STORMWATER QUALITY DESIGNS BY THE COUNTY DOES NOT ABSOLVE THE OWNER, DEVELOPER, AND/OR DESIGN ENGINEER OF THEIR DESIGN RESPONSIBILITIES. THE DESIGN ENGINEER HAS THE RESPONSIBILITY TO DESIGN BASIN FACILITIES THAT MEET INDUSTRY STANDARDS OF PRACTICE, MEET WATER QUALITY CONTROL STANDARDS AND REGULATIONS, MEET EXPECTED FACILITY USEFUL LIFE ESTIMATES, AND ARE PROGRAMMATICALLY MAINTAINABLE BY THOSE ULTIMATELY RESPONSIBLE FOR THE OWNERSHIP, OPERATION, AND MAINTENANCE OF THOSE BASIN FACILITIES.
3. THE STANDARD PLANS HEREIN WERE DEVELOPED FOR STORMWATER QUALITY BASINS FOR USE WITH WATERSHEDS LARGER THAN 5 ACRES. THE COUNTY'S TECHNICAL GUIDANCE DOCUMENT (TGD) FOR THE PREPARATION OF WATER QUALITY MANAGEMENT PLANS AND THE MODEL WATER QUALITY MANAGEMENT PLAN (MODEL WQMP) CONTAIN METHODS AND DISCUSSIONS CONCERNING THE STORMWATER QUALITY MANAGEMENT FOR ALL SIZE CATCHMENT AREAS THE TGD AND MODEL WQMP SHALL BE CONSULTED AND APPLIED AS APPLICABLE.
4. ANY DESIGN DEVIATIONS FROM THE STANDARD PLANS SHALL BE RARE AND MUST BE APPROVED BY THE COUNTY, OC PUBLIC WORKS CHIEF ENGINEER/COUNTY ENGINEER, ANY DEVIATIONS FROM THE STANDARD PLANS SHALL BE IDENTIFIED BY A NOTE ON THE PLANS. THESE DEVIATIONS SHALL BE SUMMARIZED ON THE TITLE SHEET OF THE PLANS AND A SIGNATORY SPACE AUTHORIZING SUCH DEVIATION SHALL BE PROVIDED.
5. STANDARD PLANS CONTAINED HEREIN SHALL ONLY BE APPLICABLE TO THOSE BASINS AS DEFINED WITHIN TABLE 1 – DEFINITION OF BASIN TYPES AND APPLICATIONS ON SHEET 3 OF 6 OF THIS STANDARD PLAN. THESE STANDARDS AND SPECIFICATIONS DO NOT SERVE AS A GUIDE FOR THE DESIGN OF FLOOD CONTROL BASINS.
6. THE DESIGNER SHALL INCLUDE A HYDROLOGY CATCHMENT EXHIBIT FOR BASINS WITHIN THE AREAS THIS EXHIBIT SHALL INCLUDE: LAND USE TYPES, ACREAGE OF TREATED WATERSHED WITHIN PROJECT AREA, ANY ACREAGES OF SURROUNDING ENVIRONS TRIBUTARY TO BASIN, FLOW PATHS, TIMES OF CONCENTRATION, RAINFALL INTENSITIES, BASIN STAGE STORAGE ROUTING CURVES, AND PEAK FLOW RATES FOR 2, 10, 25, AND 100 YEAR STORM EVENTS (AS APPLICABLE). THE SIZE OF THE CATCHMENT AREA WILL CONTROL THE GOVERNING HYDROLOGY CALCULATION METHODS. DEPENDENT UPON WATERSHED CATCHMENT SIZE, STORMWATER QUALITY AND/OR HYDROMODIFICATION CONTROL BASINS MAY REQUIRE CONFORMITY WITH THE ORANGE COUNTY HYDROLOGY MANUAL IN ADDITION TO THE REQUIREMENTS OF THE TGD OR MODEL WQMP.
7. DIVERSION STRUCTURE PLANS SHALL INCLUDE STORMWATER TREATMENT FLOW RATES MAKING IT TO THE BASIN AND THOSE THAT ARE BYPASSED WITHOUT TREATMENT ALONG THE MAIN STORM DRAIN SYSTEM.
8. EFFICACY OF THE FACILITIES NEEDS TO BE DEMONSTRATED THROUGH TESTING AND ADEQUATE COMMISSIONING. A COMMISSIONING AND EFFICACY TESTING PROCEDURE SHALL BE PREPARED AND SUBMITTED TO THE COUNTY FOR REVIEW – SEE THE TGD FOR FURTHER INFORMATION CONCERNING PERFORMANCE REQUIREMENTS.
9. IT IS ADVISED THAT STORMWATER QUALITY BASINS REMAIN OFFLINE UNTIL ALL UPLAND LAND USES AND IMPROVEMENTS ARE CONSTRUCTED. IF THIS IS NOT POSSIBLE, RUNOFF FROM UPLAND AREAS SHALL HAVE APPROPRIATE BMP STRATEGIES IN PLACE TO MITIGATE FOR INTERIM PROJECT/SITE CONDITIONS SUCH AS: UNCONTROLLED FLOWS/DISCHARGES, EXCESS SEDIMENT RUNOFF, AND FLOWS IN EXCESS OF THE DESIGN CONDITION.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

May 2021

Approved


Kevin Onuma, County Engineer

STD. PLAN

1901

GENERAL NOTES FOR STORMWATER QUALITY BASIN STANDARD PLANS

SHT. 1 OF 6

10. CONSTRUCTION OF STORMWATER QUALITY BASINS PER THE COUNTY STANDARD PLANS DOES NOT INFER OWNERSHIP OF SAID BASINS BY THE COUNTY REGARDLESS OF SIZE OF BASIN TRIBUTARY OR PERCENTAGE OF FLOWS FROM COUNTY PROPERTY. STORMWATER QUALITY BASINS THAT ARE BUILT TO COMPLY WITH THE NEW DEVELOPMENT REQUIREMENTS OF THE SAN DIEGO AND SANTA ANA MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4) PERMIT REQUIREMENTS SHALL BE OWNED AND MAINTAINED BY THE PROJECT PROPONENT UNTIL OWNERSHIP TRANSFER THROUGH AN OFFICIAL RECORDATION OF OWNERSHIP AND MAINTENANCE RESPONSIBILITY RECORDED WITH THE COUNTY RECORDER OFFICE.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

May 2021

STD. PLAN

1901

GENERAL NOTES FOR STORMWATER QUALITY BASIN STANDARD PLANS

SHT. 2 OF 6

TABLE I – DEFINITION OF BASIN TYPES AND APPLICATIONS

BASIN TYPE	PURPOSE	TREATMENT PROCESS	DISCHARGE ⁵	SIZING CRITERIA
BIOINFILTRATION (ALSO CALLED BIORETENTION WITH ELEVATED UNDERDRAIN) (LID BASIN)	STORMWATER TREATMENT IN SITES WITH LOW PERMEABILITY	VERTICAL FLOW THROUGH VEGETATION AND ENGINEERED SOIL	PRIMARILY THROUGH UNDERDRAINS WITH VARYING AMOUNTS OF INFILTRATION	DCV IS CAPTURED AND/OR TREATED DURING DESIGN STORM. REFER TO TGD
INFILTRATION (LID BASIN)	STORMWATER TREATMENT IN SITES WITH HIGH SOIL PERMEABILITY	WATER TREATED BY PASSING THROUGH NATIVE SOIL	VIA INFILTRATION	DCV IS CAPTURED AND INFILTRATED. REFER TO TGD
HYDROMODIFICATION CONTROL	CONTROL OF DISCHARGE RATE, FLOW DURATION, AND VOLUME DURING MODERATE STORM EVENTS	TREATMENT IS NOT A PRIMARY DESIGN GOAL FOR THIS BASIN TYPE	TYPICALLY THROUGH A SYSTEM OF ORIFICES AND/OR WEIRS TO MIMIC NATURAL FLOW REGIME	SIZE TO CAPTURE INCREASED VOLUME OR PEAK DISCHARGE RESULTING FROM PROJECT DEVELOPMENT. REFER TO TGD
COMBINATION BASIN (HYDROMODIFICATION CONTROL WITH BIOINFILTRATION)	WATER QUALITY AND HYDROMODIFICATION CONTROL	VERTICAL FLOW THROUGH ENGINEERED SOIL	INFILTRATION AND HYDRAULIC CONTROLS (ORIFICES, WEIRS)	DCV PLUS ADDITIONAL VOLUME FOR DISCHARGE RATE MANAGEMENT. IN SOME CASES RETENTION BEYOND DCV MAY BE PROVIDED
COMBINATION BASIN (HYDROMODIFICATION) CONTROL WITH INFILTRATION)	WATER QUALITY AND HYDROMODIFICATION CONTROL	WATER TREATED BY PASSING THROUGH NATIVE SOIL	INFILTRATION AND HYDRAULIC CONTROLS (ORIFICES, WEIRS)	DCV PLUS ADDITIONAL VOLUME FOR DISCHARGE RATE MANAGEMENT. IN SOME CASES RETENTION BEYOND DCV MAY BE PROVIDED
MULTI-PURPOSE BASIN	HYDROMODIFICATION CONTROL PLUS ADDITIONAL NON-STORMWATER FUNCTION	TREATMENT IS NOT A PRIMARY DESIGN GOAL FOR THIS BASIN TYPE	TYPICALLY THROUGH A SYSTEM OF ORIFICES AND/OR WEIRS TO MIMIC NATURAL FLOW REGIME	SIZE TO CAPTURE INCREASED VOLUME OR PEAK DISCHARGE RESULTING FROM PROJECT DEVELOPMENT. REFER TO TGD
FLOOD CONTROL	CONTROL OF PEAK RUNOFF RATE FOR LARGE STORMS	REFER TO THE OCFCO DESIGN MANUAL & OCHM FOR REGIONAL FLOOD CONTROL DESIGN INFORMATION		

NOTES:

1. DCV – DESIGN CAPTURE VOLUME
2. TGD – ORANGE COUNTY TECHNICAL GUIDANCE DOCUMENT FOR EITHER NORTH COUNTY OR SOUTH COUNTY
3. COMBINATION BASIN IS A LID BASIN (EITHER BIOINFILTRATION OR INFILTRATION) WITH DETENTION VOLUME FOR HYDROMODIFICATION CONTROL PROVIDED, TYPICALLY ABOVE THE WATER QUALITY VOLUME. IN SOME CASES, ADDITIONAL RETENTION VOLUME BEYOND DCV MAY BE PROVIDED.
4. MULTI-PURPOSE BASINS ARE ONE OF THE ABOVE BASIN TYPES CUSTOMIZED TO SUIT ANOTHER LAND USE SUCH AS PARK OR OPEN SPACE. DETAILS AND DESIGN FEATURES WILL TYPICALLY BE CUSTOMIZED TO SUIT THE LAND USE AND THUS MAY DIFFER FROM STANDARD PLANS.
5. ALL BASINS WILL HAVE AN OVERFLOW OUTLET FOR VOLUMES LARGER THAN THE DESIGN VOLUME.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved

Kevin Onuma
Kevin Onuma, County Engineer

May 2021

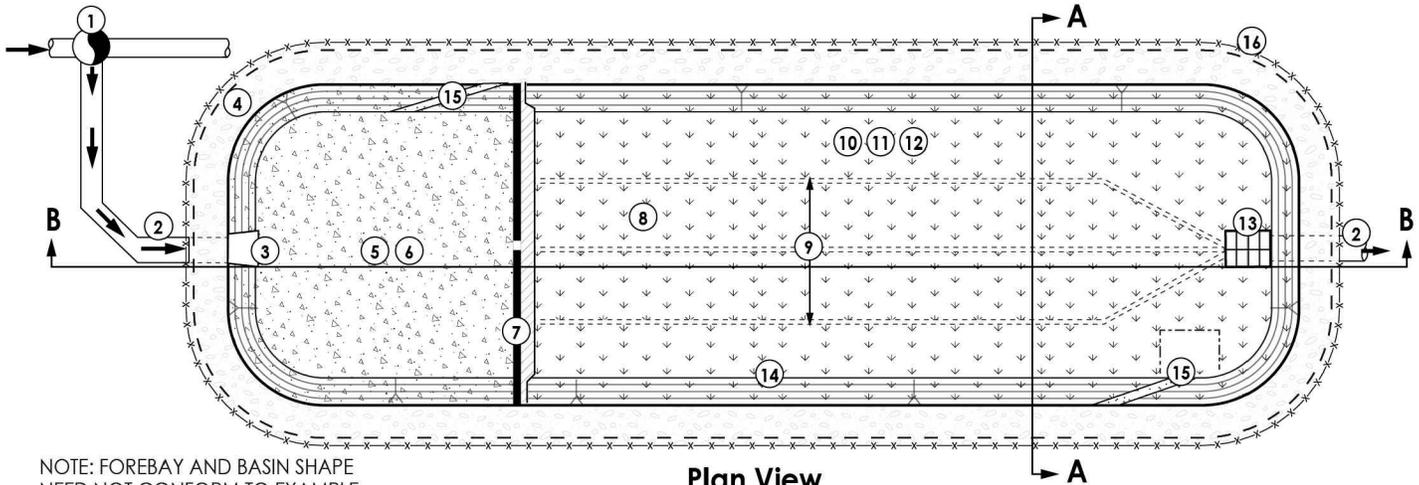
STD. PLAN

1901

GENERAL NOTES FOR STORMWATER QUALITY BASIN STANDARD PLANS

SHT. 3 OF 6

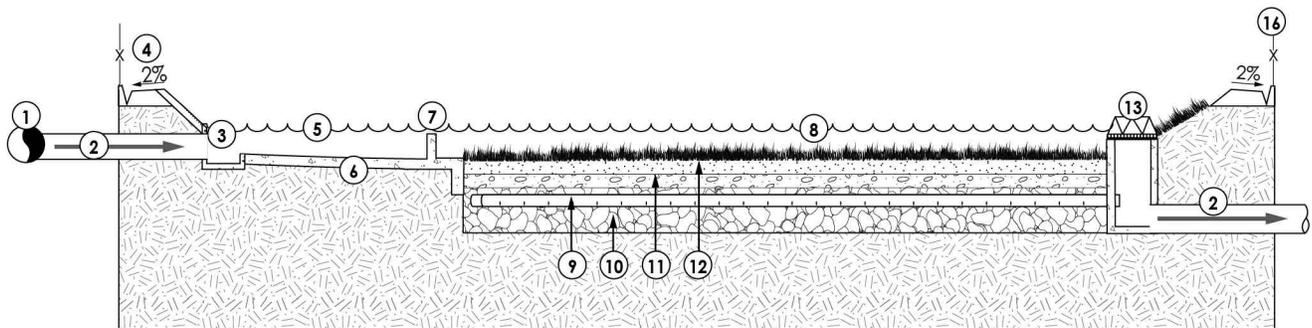
BIOINFILTRATION - LID BASIN (ALSO CALLED BIORETENTION WITH ELEVATED UNDERDRAIN)



NOTE: FOREBAY AND BASIN SHAPE NEED NOT CONFORM TO EXAMPLE SHAPE SHOWN HEREON.

Plan View

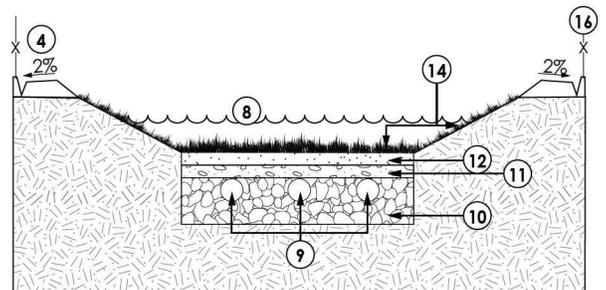
TYPICAL PROCESS TRAIN EXAMPLE, NOT TO SCALE.



Profile View B-B

TYPICAL PROCESS TRAIN EXAMPLE, NOT TO SCALE.

- | | |
|--|---|
| ① DIVERSION STRUCTURE, SP 1902 | ⑩ INFILTRATION STORAGE LAYER, SP 1909 |
| ② STORM DRAIN PIPE | ⑪ FILTER COURSE, SP 1909 |
| ③ CONCRETE HEADWALL INLET STRUCTURE, SP 1903 | ⑫ BIORETENTION SOIL MEDIA (BSM), SP 1910 |
| ④ PERIMETER ROAD WITH "V" DITCH, SP 1905 | ⑬ OVERFLOW TOWER OR STANDPIPE WITH INTAKE GRATE (BIRDCAGE), SP 1911 OR 1912 |
| ⑤ PRE-TREATMENT FOREBAY, SP 1904 | ⑭ VEGETATED SIDE SLOPES & INVERT, SP 1907 |
| ⑥ CONCRETE LINING - SLOPE AND INVERT, SP 1904 | ⑮ ACCESS RAMP REQUIRED AT FOREBAY AND BASIN. ADDITIONAL RAMPS MAY BE NECESSARY BASED UPON BASIN SIZE AND CONFIGURATION, SP 1906 |
| ⑦ FOREBAY END SILL WALL WITH LOW FLOW NOTCH, SP 1904 | ⑯ PERIMETER FENCING/GATES (IF NECESSARY), SP 600-3-OC |
| ⑧ BIOFILTRATION TREATMENT AND STORAGE AREA | |
| ⑨ SLOTTED UNDERDRAIN PIPE WITH CLEANOUTS, SP 1909 | |



Section View A-A

TYPICAL PROCESS TRAIN EXAMPLE, NOT TO SCALE.

THE COUNTY ASSUMES NO RESPONSIBILITY FOR THE DESIGN OF FACILITIES ADHERING TO THE STANDARD PLANS CONTAINED HEREIN. REVIEW AND APPROVAL OF STORMWATER QUALITY DESIGNS BY THE COUNTY DOES NOT ABSOLVE THE OWNER, DEVELOPER, AND/OR DESIGN ENGINEER OF THEIR DESIGN RESPONSIBILITIES.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

May 2021

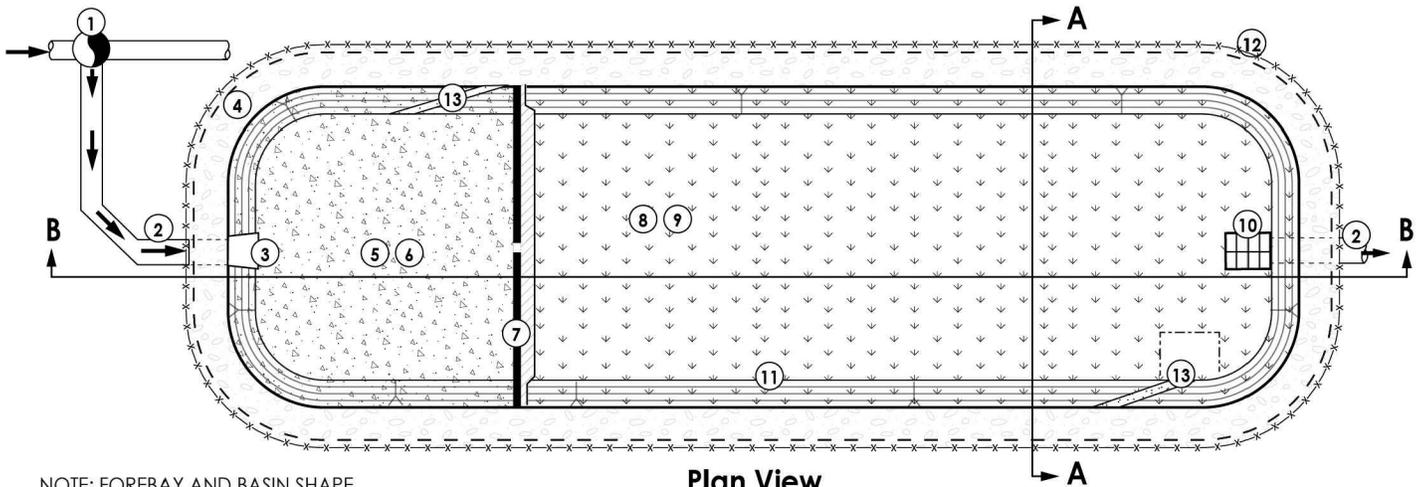
STD. PLAN

1901

GENERAL NOTES FOR STORMWATER QUALITY BASIN STANDARD PLANS

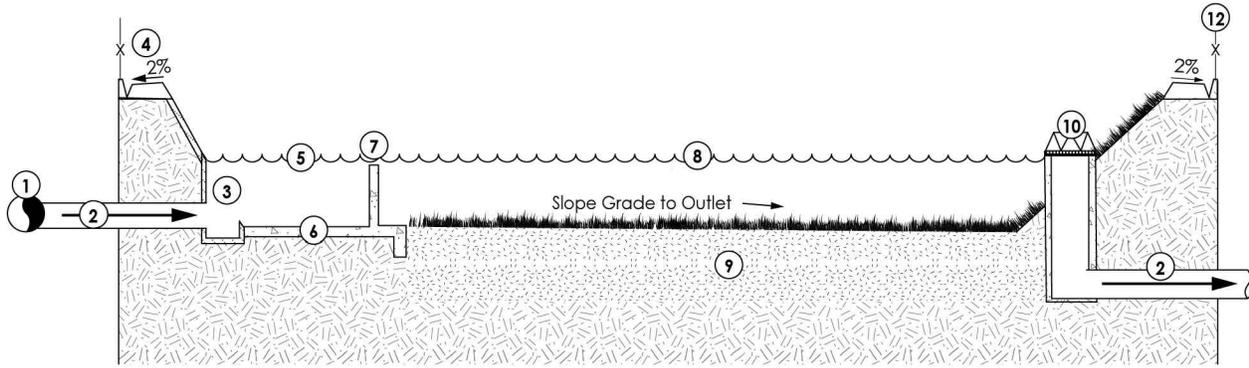
SHT. 4 OF 6

INFILTRATION BASIN (LID BASIN)



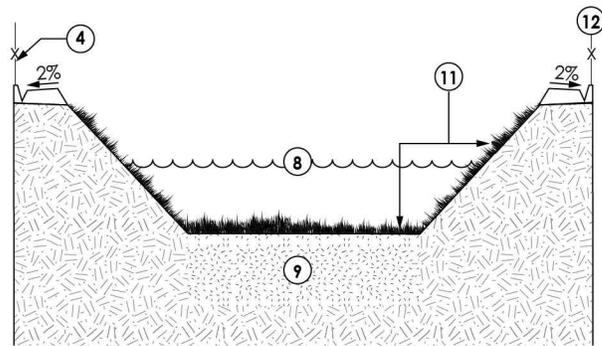
NOTE: FOREBAY AND BASIN SHAPE NEED NOT CONFORM TO EXAMPLE SHAPE SHOWN HEREON.

Plan View
TYPICAL PROCESS TRAIN EXAMPLE, NOT TO SCALE.



Profile View B-B
TYPICAL PROCESS TRAIN EXAMPLE, NOT TO SCALE.

- | | |
|--|---|
| ① DIVERSION STRUCTURE, SP 1902 | ⑨ NATIVE SOIL SUITABLE FOR INFILTRATION (PER TGD) |
| ② STORM DRAIN PIPE | ⑩ OVERFLOW TOWER OR STANDPIPE WITH INTAKE GRATE (BIRDCAGE), SP 1913 OR 1914 |
| ③ CONCRETE HEADWALL INLET STRUCTURE, SP 1903 | ⑪ VEGETATED SIDE SLOPES & INVERT, SP 1907 |
| ④ PERIMETER ROAD WITH "V" DITCH, SP 1905 | ⑫ PERIMETER FENCING/ GATES (IF NECESSARY), SP 600-3-OC |
| ⑤ PRE-TREATMENT FOREBAY, SP 1904 | ⑬ ACCESS RAMP REQUIRED AT FOREBAY AND BASIN. ADDITIONAL RAMPS MAY BE NECESSARY BASED UPON BASIN SIZE AND CONFIGURATION, SP 1906 |
| ⑥ CONCRETE LINING - SLOPE AND INVERT, SP 1904 | |
| ⑦ FOREBAY END SILL WALL WITH LOW FLOW NOTCH, SP 1904 | |
| ⑧ WATER QUALITY BASIN INFILTRATION AND STORAGE AREA | |



Section A-A
TYPICAL PROCESS TRAIN EXAMPLE, NOT TO SCALE.

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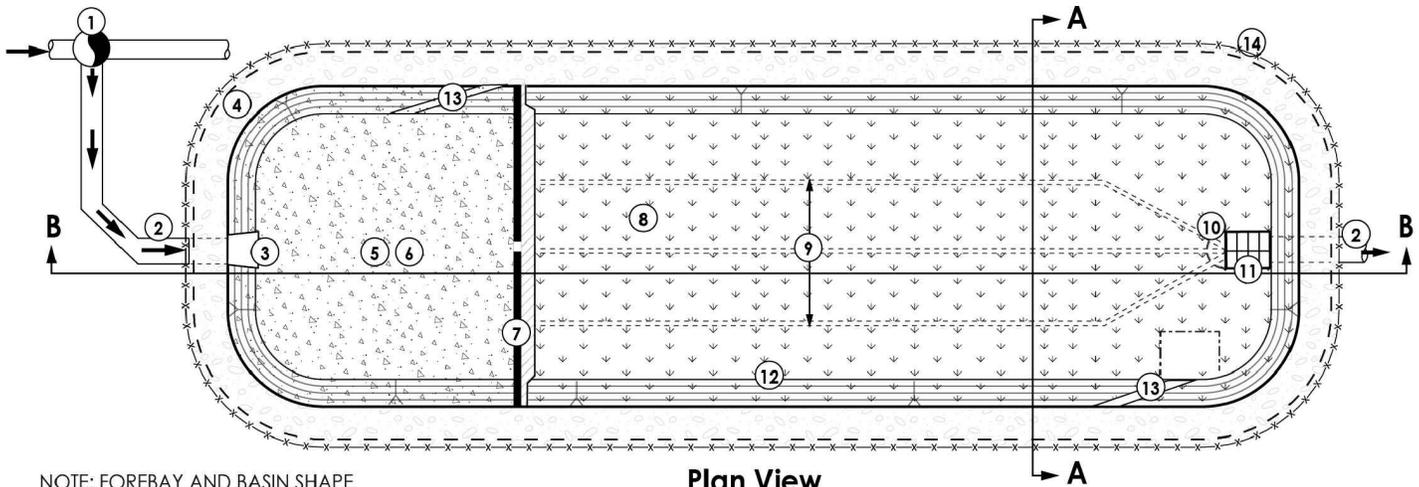
STD. PLAN

1901

GENERAL NOTES FOR STORMWATER QUALITY BASIN STANDARD PLANS

SHT. 5 OF 6

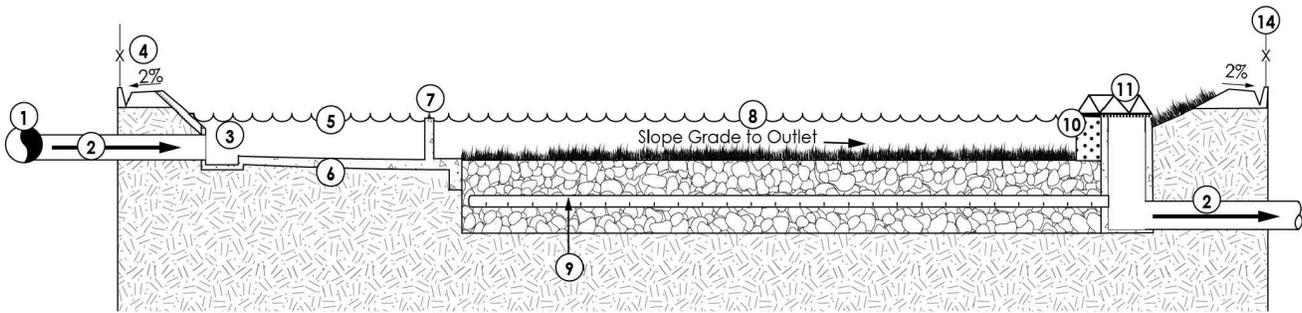
HYDROMODIFICATION CONTROL BASIN



Plan View

TYPICAL PROCESS TRAIN EXAMPLE, NOT TO SCALE.

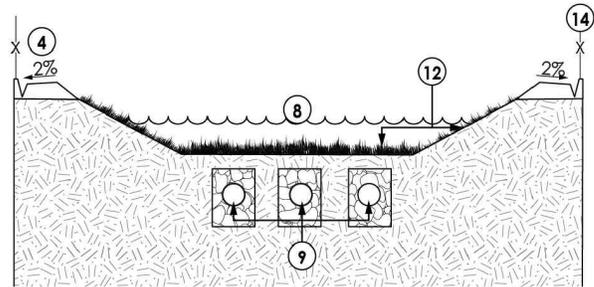
NOTE: FOREBAY AND BASIN SHAPE NEED NOT CONFORM TO EXAMPLE SHAPE SHOWN HEREON.



Profile View B-B

TYPICAL PROCESS TRAIN EXAMPLE, NOT TO SCALE.

- | | |
|--|--|
| ① DIVERSION STRUCTURE, SP 1902 | ⑩ HYDROMOD OUTLET CONTROL WEIR OR ORIFICE WITH TRASH RACK, SP 1915 OR 1916 |
| ② STORM DRAIN PIPE | ⑪ OVERFLOW TOWER OR STANDPIPE WITH INTAKE GRATE (BIRDCAGE), SP 1915 OR 1916 |
| ③ CONCRETE HEADWALL INLET STRUCTURE, SP 1903 | ⑫ VEGETATED SIDE SLOPES & INVERT, SP 1907 |
| ④ PERIMETER ROAD WITH "V" DITCH, SP 1905 | ⑬ ACCESS RAMP REQUIRED AT FOREBAY AND BASIN. ADDITIONAL RAMP MAY BE NECESSARY BASED UPON BASIN SIZE AND CONFIGURATION, SP 1906 |
| ⑤ PRE-TREATMENT FOREBAY, SP 1904 | ⑭ PERIMETER FENCING/ GATES (IF NECESSARY), SP 600-3-OC |
| ⑥ CONCRETE LINING - SLOPE AND INVERT, SP 1904 | |
| ⑦ FOREBAY END SILL WALL WITH LOW FLOW NOTCH, SP 1904 | |
| ⑧ HYDROMODIFICATION CONTROL STORAGE AREA | |
| ⑨ SLOTTED UNDERDRAIN PIPE WITH CLEANOUTS, SP 1909 (OPTIONAL) | |



Section A-A

TYPICAL PROCESS TRAIN EXAMPLE, NOT TO SCALE.

THE COUNTY ASSUMES NO RESPONSIBILITY FOR THE DESIGN OF FACILITIES ADHERING TO THE STANDARD PLANS CONTAINED HEREIN. REVIEW AND APPROVAL OF STORMWATER QUALITY DESIGNS BY THE COUNTY DOES NOT ABSOLVE THE OWNER, DEVELOPER, AND/OR DESIGN ENGINEER OF THEIR DESIGN RESPONSIBILITIES.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

May 2021

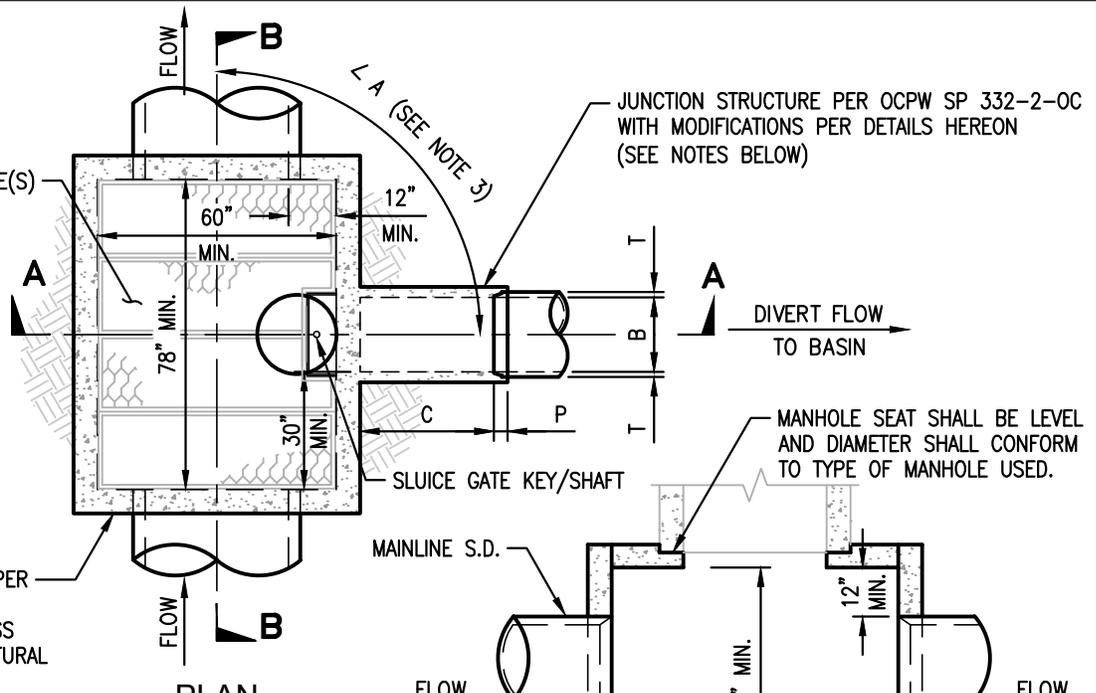
STD. PLAN

1901

GENERAL NOTES FOR STORMWATER QUALITY BASIN STANDARD PLANS

SHT. 6 OF 6

REMOVABLE ALUMINUM GRATE(S)
(DIMENSIONS PER PLAN)

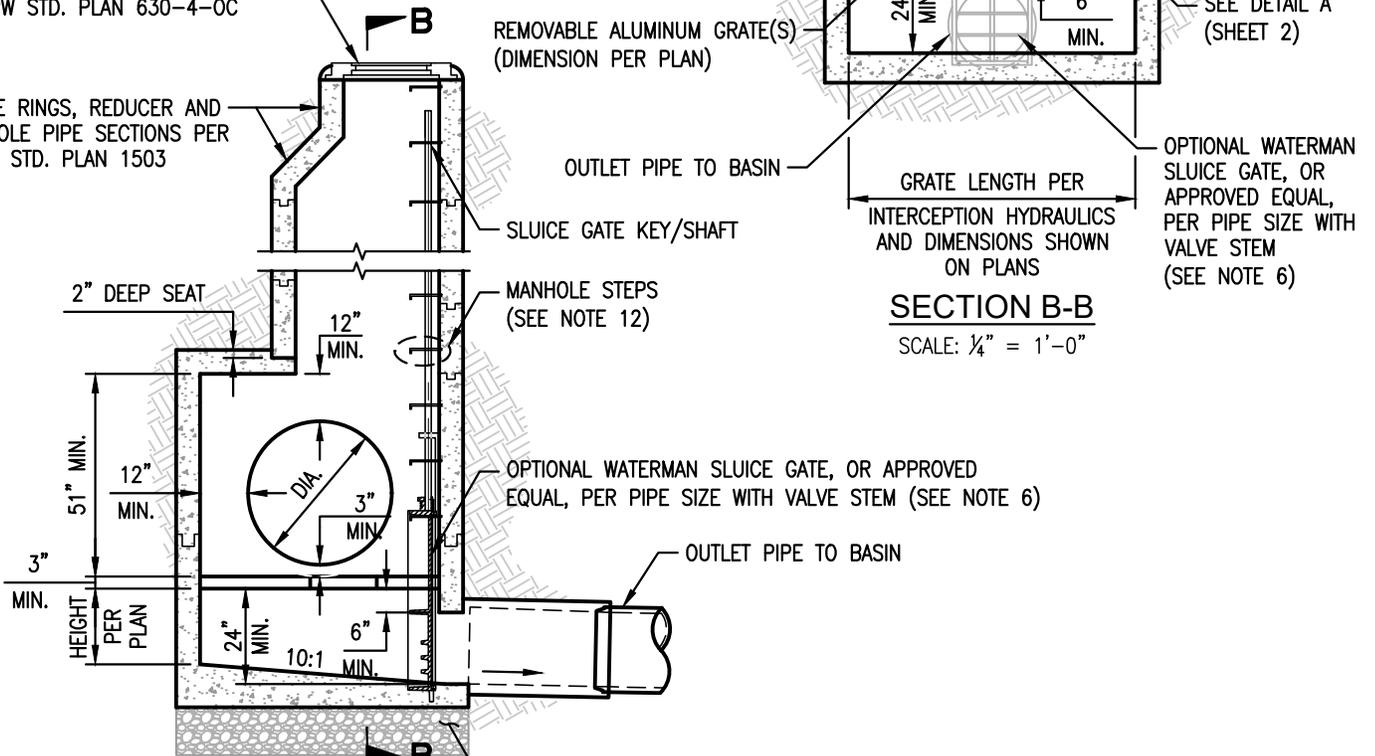


PLAN
SCALE: 1/4" = 1'-0"

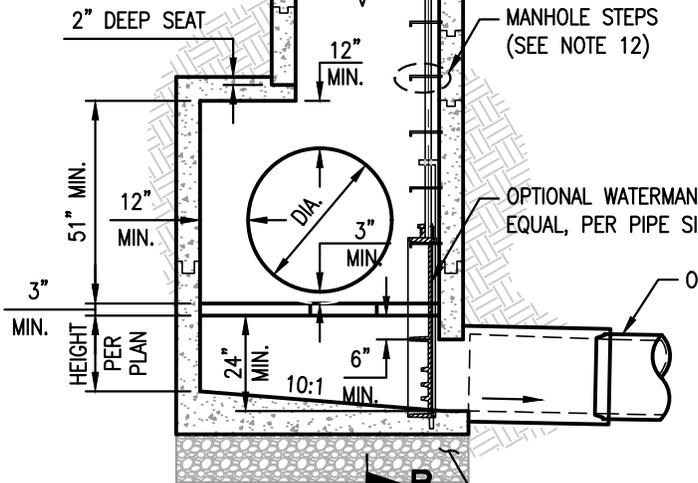
DIVERSION STRUCTURE VAULT PER
MINIMUM DIMENSIONS SHOWN
HEREON. CONCRETE THICKNESS
AND REINFORCING PER STRUCTURAL
DESIGN REQUIREMENTS.

MANHOLE FRAME AND COVER PER
OCPW STD. PLAN 630-4-0C

GRADE RINGS, REDUCER AND
MANHOLE PIPE SECTIONS PER
OCPW STD. PLAN 1503



SECTION B-B
SCALE: 1/4" = 1'-0"



SECTION A-A
SCALE: 1/4" = 1'-0"

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

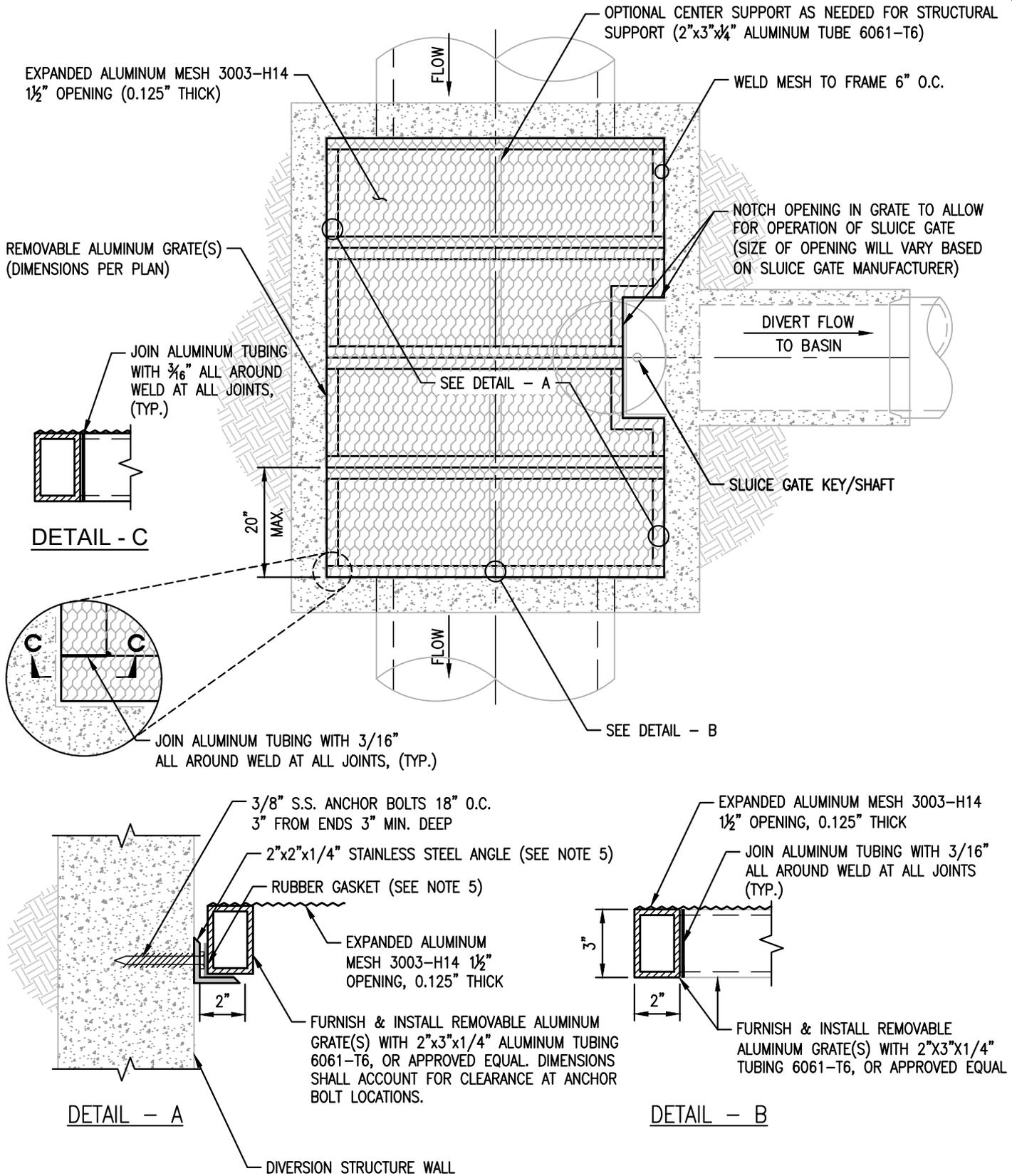
May 2021

STD. PLAN

1902

STORM DRAIN DIVERSION STRUCTURE

SHT. 1 OF 3



COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

May 2021

STD. PLAN

1902

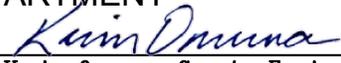
STORM DRAIN DIVERSION STRUCTURE

SHT. 2 OF 3

NOTES:

1. REINFORCING STEEL FOR JUNCTION STRUCTURE SHALL BE IN ACCORDANCE WITH OCPW STD. PLAN 333-2-OC. CONCRETE SHALL BE 560-C-3250 PER GREENBOOK SPECIFICATIONS SECTION 201-1.1.2 AND SHALL CONFORM TO THE REQUIREMENTS OF OCPW STD. PLAN 1803.
2. VALUES FOR A, B, C, P, T AND DIA. SHALL BE SHOWN ON THE PLANS, AND SHALL BE IN ACCORDANCE WITH OCPW STD. PLAN 333-2-OC.
3. ANGLE 'A' FOR DIVERSION PIPE MAY VARY BETWEEN 30° MINIMUM AND 90° MAXIMUM.
4. DIVERSION STRUCTURE SHALL BE HYDRAULICALLY SIZED FOR STORM DRAIN DESIGN FLOW AND CORRESPONDING DIVERSION PIPE TO BASIN HYDRAULICALLY SIZED FOR THE CONVEYANCE OF THE WATER QUALITY OR HYDROMODIFICATION FLOWRATE.
5. A RUBBER GASKET SHALL BE INSTALLED BETWEEN ALUMINUM GRATES AND STAINLESS STEEL ANGLE TO PREVENT CORROSION BETWEEN DISSIMILAR METAL SURFACES. RUBBER GASKET CAN BE OMITTED IF STAINLESS STEEL GRATES ARE PROVIDED IN LIEU OF ALUMINUM GRATES.
6. SEE MANUFACTURER DETAILS ON FRAME AND SEATING REQUIREMENTS FOR SLUICE GATE (IF SLUICE GATE IS INCLUDED)
7. GRATE LENGTH SIZED HYDRAULICALLY FOR CAPACITY BASED ON THE "SPASH-OVER VELOCITY" PER FHWA EQUATION FOR GRATE HYDRAULICS ASSUMING THE INTERCEPTION OF THE UPPER NAPPE OF THE HYDRAULIC JET BASED UPON THE DEPTH OF FLOW IN THE PARTIALLY FULL PIPE IS FULLY INTERCEPTED BY THE GRATE. GRATE HYDRAULICS NEED TO ACCOUNT FOR LOSS OF OPENING AREA DUE TO THE GRATE.
8. MINIMUM DEPTH OF THE CHAMBER BELOW THE GRATE IS BASED ON THE TAIL WATER DOWN FROM THE OUTLET PIPE TO THE BASIN CALCULATED USING BOTH THE ENERGY EQUATION AND THE OUTLET CONTROL HYDRAULICS FOR THE PIPE.
9. SLUICE GATE OR ISOLATION VALVE IS USED TO PREVENT DISCHARGE TO BASIN DURING PERIODS OF MAINTENANCE FOR THE BASIN. WATERMAN SLUICE GATE OR EQUIVALENT AND FRAME WITH VALVE STEM THAT EXTENDS THE ENTIRE LENGTH OF THE MANHOLE SHAFT. VALVE STEM ATTACHES TO MANHOLE SHAFT WITH MANUFACTURER METAL GUIDE CLAMPS. STEM EXTENSION WILL BE USED BY MAINTENANCE PERSONNEL STANDING ON STREET SURFACE TO OPERATE GATE.
10. REMOVABLE ALUMINUM GRATES OVER DIVERSION CHAMBER SHALL BE PROVIDED AS SAFETY MEASURE FOR MAINTENANCE STAFF
11. INTERCEPTION CHAMBER INVERT SHALL BE SLOPED TO OUTLET PIPE TO ENSURE DRAINAGE.
12. MANHOLE STEPS SHALL BE POLYPROPYLENE MANUFACTURED BY LANE INTERNATIONAL CORPORATION (MODEL P-14938), OR EQUIVALENT AS APPROVED BY OCPW. VERTICAL SPACING OF MANHOLE STEPS SHALL BE IN ACCORDANCE WITH OCPW STANDARD PLAN 1507.
13. GRATE SHALL BE DEPRESSED SLIGHTLY BELOW INVERT OF INLET PIPE TO ENSURE MAXIMUM CAPTURE AMOUNT BASED UPON GRATE CAPTURE HYDRAULICS (PER FHWA GRATE HYDRAULICS).
14. GRATE HYDRAULIC CALCULATIONS TO BE PROVIDED BY DESIGNER TO DEMONSTRATE THAT DESIGN Q WILL PASS THROUGH GRATE. PLAN SHALL INCLUDE SPECIFIC DETAILS WHERE MODIFICATIONS ARE REQUIRED TO STANDARD DETAILS.
15. GRAVEL BASE FOUNDATION SHALL BE NO. 3 ROCK (12" MIN. LAYER THICKNESS) WRAPPED IN FABRIC PER OCPW STANDARD PLANS 1803 AND 1808, OR EQUIVALENT PER PROJECT GEOTECHNICAL ENGINEER RECOMMENDATION.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved 
Kevin Onuma, County Engineer

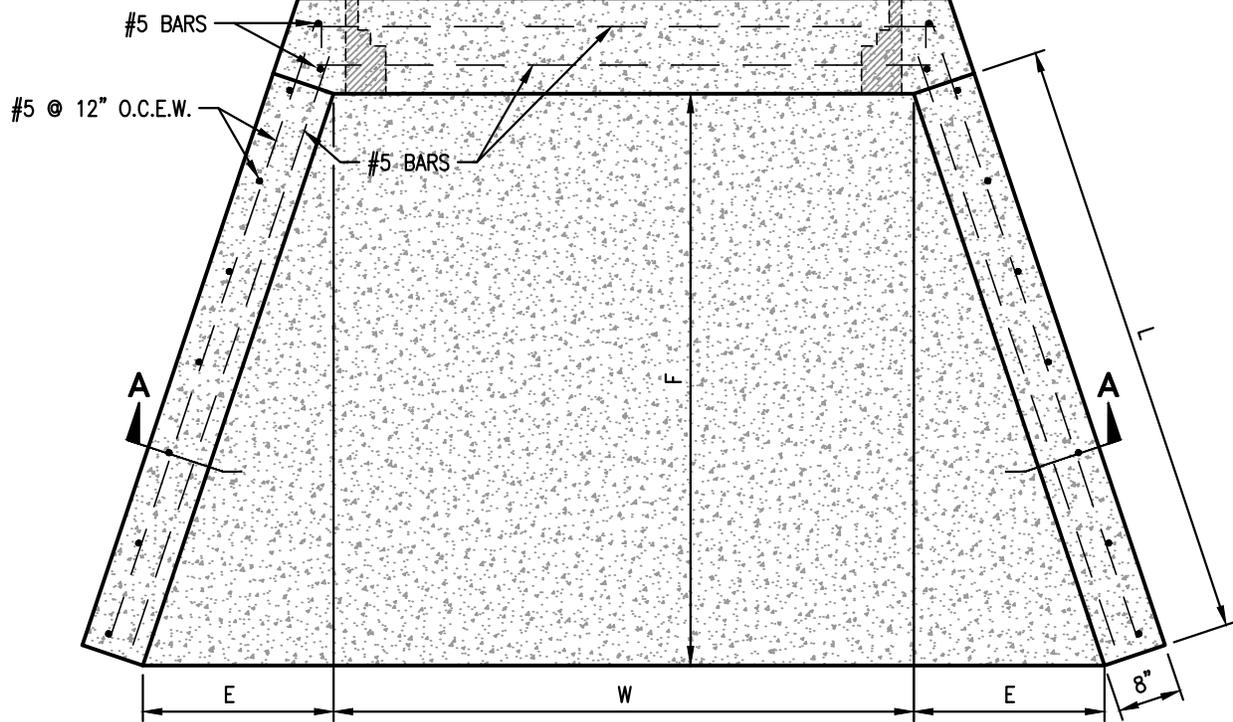
May 2021

STD. PLAN

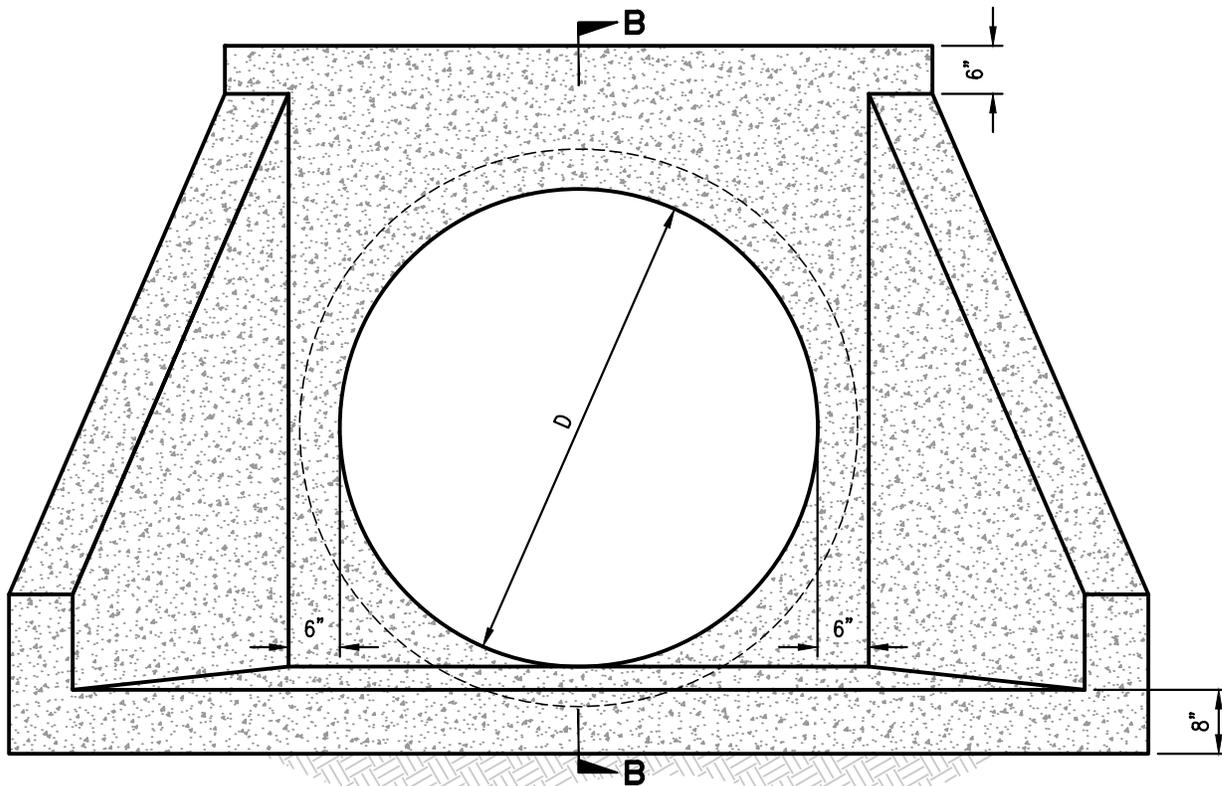
1902

STORM DRAIN DIVERSION STRUCTURE

SHT. 3 OF 3



PLAN
SCALE: 1/2" = 1'-0"



ELEVATION
SCALE: 1/2" = 1'-0"

VALUES FOR L, E, F & W ARE PROVIDED ON SHEET 3 OF THIS DETAIL BASED ON PIPE DIAMETER (D).

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

May 2021

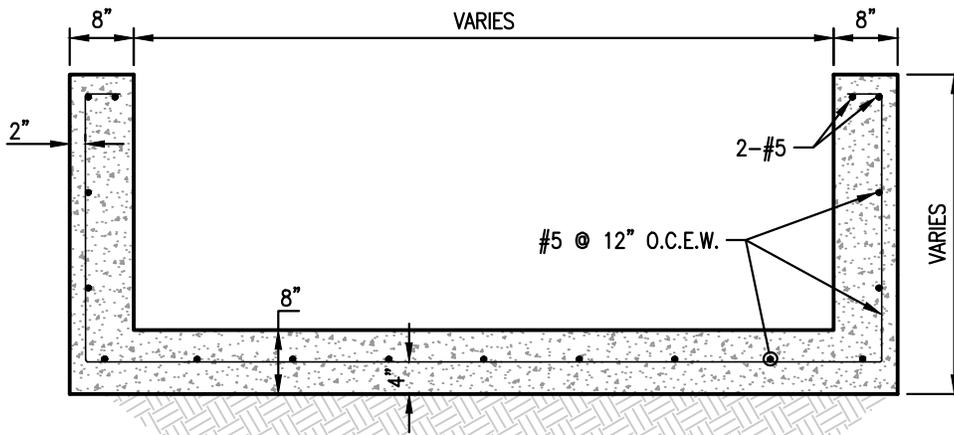
Approved *Kevin Onuma*
Kevin Onuma, County Engineer

STD. PLAN

1903

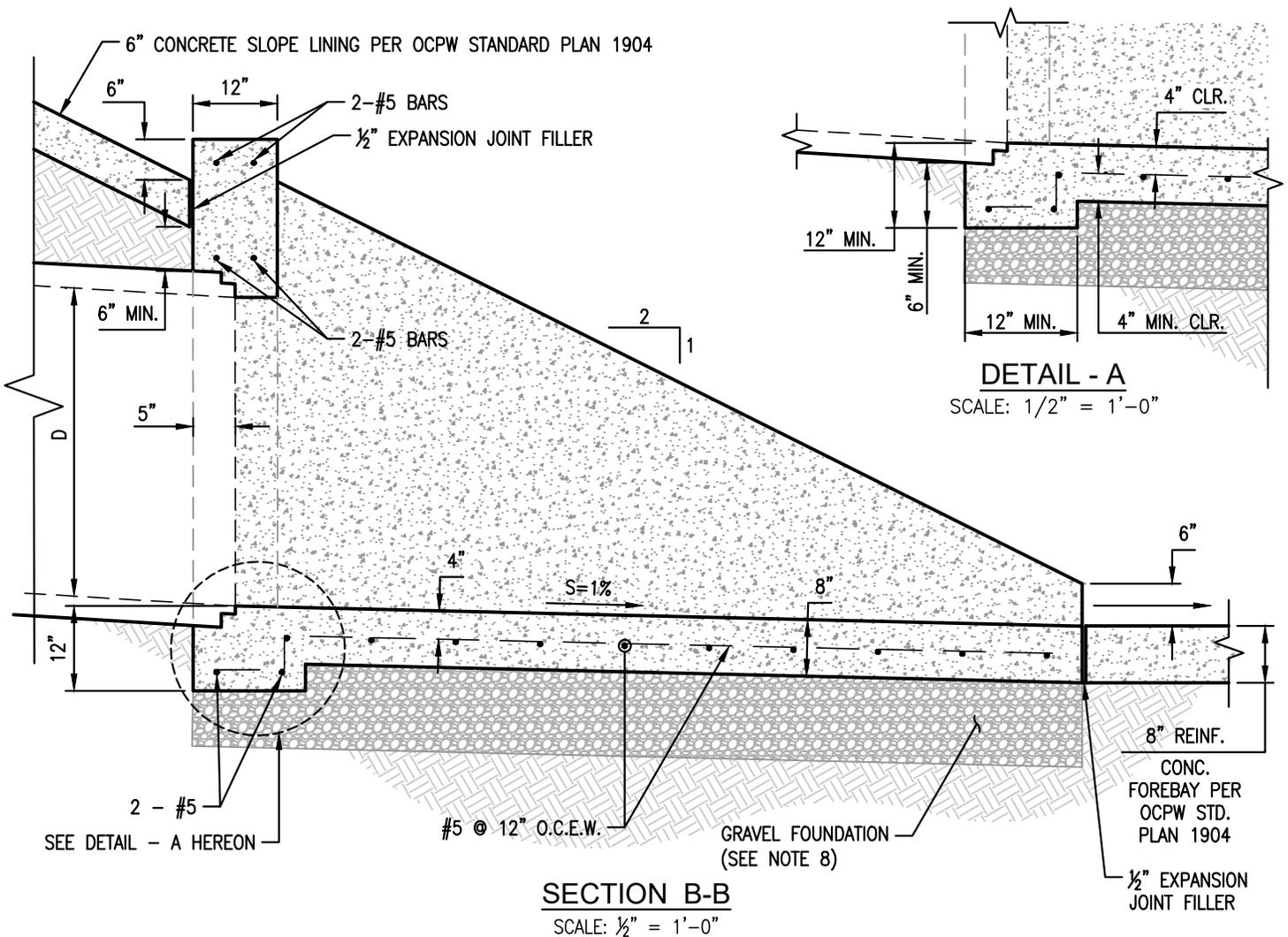
SHT. 1 OF 3

FLARED HEADWALL FOR 18" TO 84" PIPES



SECTION A-A

SCALE: 1/2" = 1'-0"



DETAIL - A

SCALE: 1/2" = 1'-0"

SECTION B-B

SCALE: 1/2" = 1'-0"

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

May 2021

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1903

FLARED HEADWALL FOR 18" TO 84" PIPES

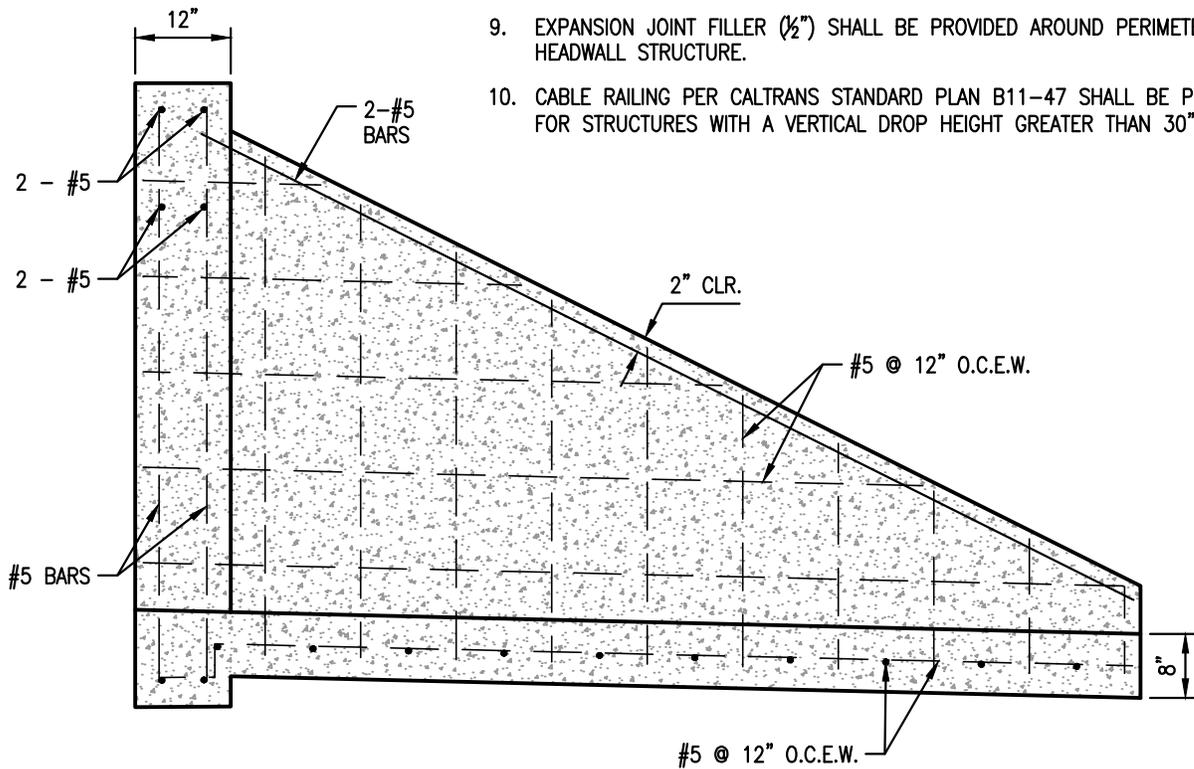
SHT. 2 OF 3

PIPE DIA. D	DIMENSIONS			
	L	E	F	W
18"	4'-8"	1'-3"	4'-10"	2'-6"
24"	5'-8"	1'-9"	5'-11"	3'-0"
30"	6'-9"	2'-3"	7'-2"	3'-6"
36"	7'-10"	2'-9"	8'-3"	4'-0"
42"	9'-0"	3'-3"	9'-7"	4'-6"
48"	10'-0"	3'-9"	10'-8"	5'-0"
54"	11'-2"	4'-3"	12'-0"	5'-6"
60"	12'-3"	4'-9"	13'-1"	6'-0"
66"	13'-5"	5'-3"	14'-5"	6'-6"
72"	14'-5"	5'-9"	15'-6"	7'-0"
78"	15'-8"	6'-3"	16'-10"	7'-6"
84"	16'-8"	6'-9"	18'-0"	8'-0"

DIMENSIONS SHOWN ARE BASED UPON 2:1 FOREBAY SLOPES. IF OTHER SLOPE ANGLE IS USED, ADJUST ACCORDING TO REQUIRED GEOMETRY.

NOTES:

1. CONCRETE SHALL BE 560-C-3250 PER GREENBOOK SPECIFICATIONS SECTION 201-1.1.2 AND CONFORM WITH REQUIREMENTS OF OCPW STD. PLAN 1803.
2. EXPOSED CORNERS TO BE CHAMFERED $\frac{3}{4}$ ".
3. SKEWED PIPES: DIMENSION W TO BE INCREASED TO ACCOUNT FOR INCREASED WIDTH OR LENGTH DUE TO SKEW OF MULTIPLE PIPES.
4. MULTIPLE PIPES SHALL BE SET A DISTANCE OF $\frac{1}{2}$, WITH A 1' MINIMUM, BETWEEN OUTSIDE DIAMETER OF PIPES.
5. FLARED HEADWALL SHALL BE USED IF OUTLET VELOCITY FROM PIPE IS SUFFICIENT FOR LENGTH OF FOREBAY. IF EXCESSIVE VELOCITY IN PIPE (GREATER THAN 8 FPS), THEN ENERGY DISSIPATING OUTLET WITH BAFFLE WALL IS REQUIRED TO SUFFICIENTLY REDUCE VELOCITY TO ALLOW TRAPPING OF SEDIMENT WITHIN FOREBAY. REFER TO SPPWC STANDARD PLAN 384-3 FOR DETAILS OF ENERGY DISSIPATING (BAFFLE WALL) OUTLET.
6. CONSIDER ADDITIONAL MANHOLE BETWEEN DIVERSION STRUCTURE AND BASIN HEADWALL IF CONDITIONS EXIST WHERE REGULAR CLEANING OF STORMWATER DIVERSION PIPELINE IS ANTICIPATED.
7. REINFORCING STEEL SHALL BE GRADE 60 IN ACCORDANCE WITH ASTM A615 PER OCPW STD. PLAN 1803.
8. GRAVEL BASE FOUNDATION SHALL BE NO. 3 ROCK (12" MIN. THICKNESS) WRAPPED IN FABRIC PER OCPW STD. PLANS 1803 AND 1808, OR EQUIVALENT PER PROJECT GEOTECHNICAL ENGINEER RECOMMENDATION.
9. EXPANSION JOINT FILLER ($\frac{1}{2}$ ") SHALL BE PROVIDED AROUND PERIMETER OF HEADWALL STRUCTURE.
10. CABLE RAILING PER CALTRANS STANDARD PLAN B11-47 SHALL BE PROVIDED FOR STRUCTURES WITH A VERTICAL DROP HEIGHT GREATER THAN 30".



WING WALL REINFORCING

SCALE: $\frac{1}{2}$ " = 1'-0"

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Kevin Onuma, County Engineer

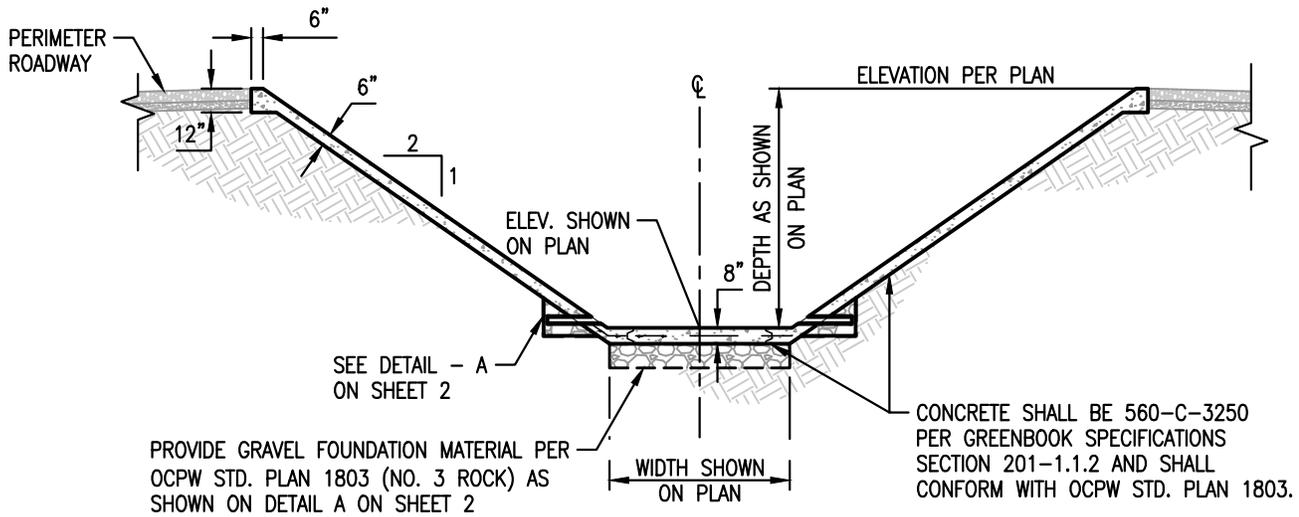
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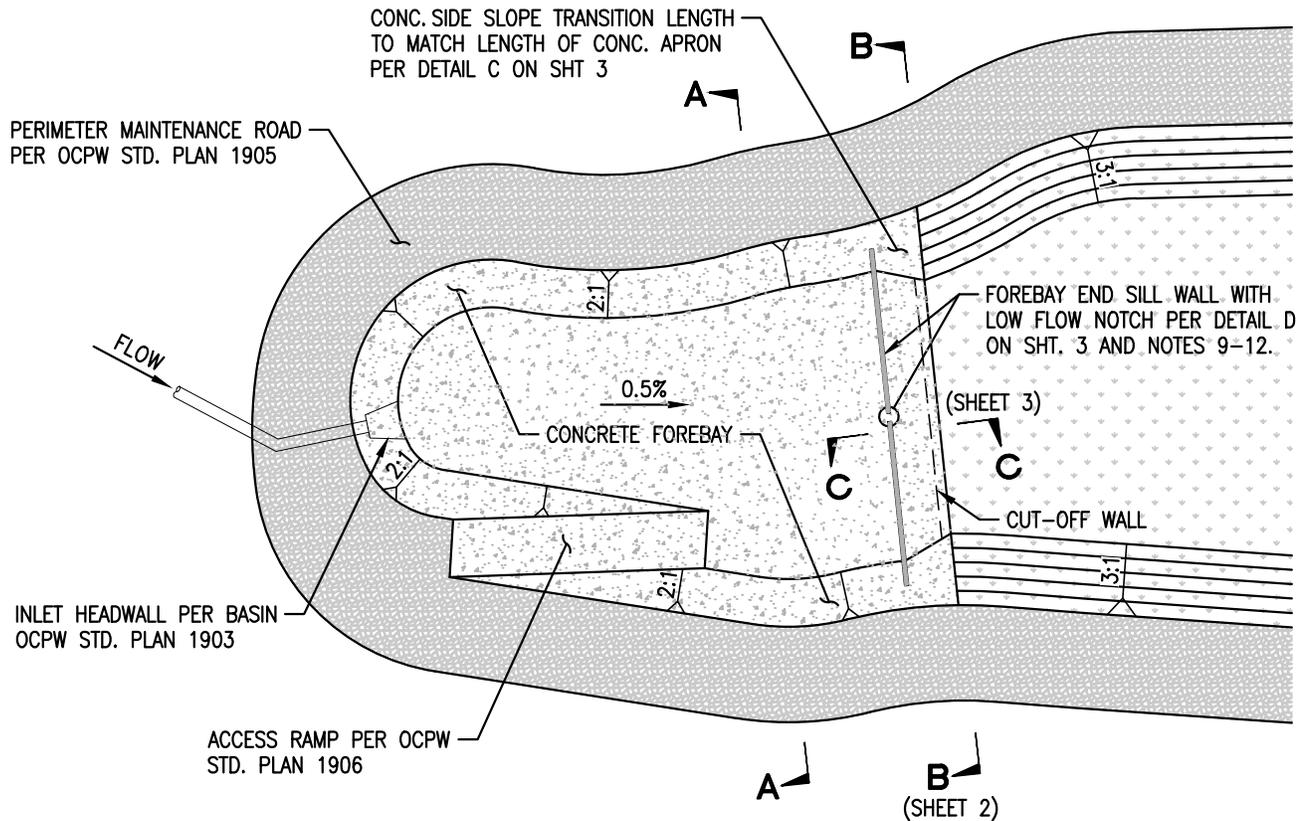
1903

FLARED HEADWALL FOR 18" TO 84" PIPES

SHT. 3 OF 3



SECTION A-A
SCALE: 1/8" = 1'-0"



PLAN VIEW
N.T.S.

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Kevin Onuma, County Engineer

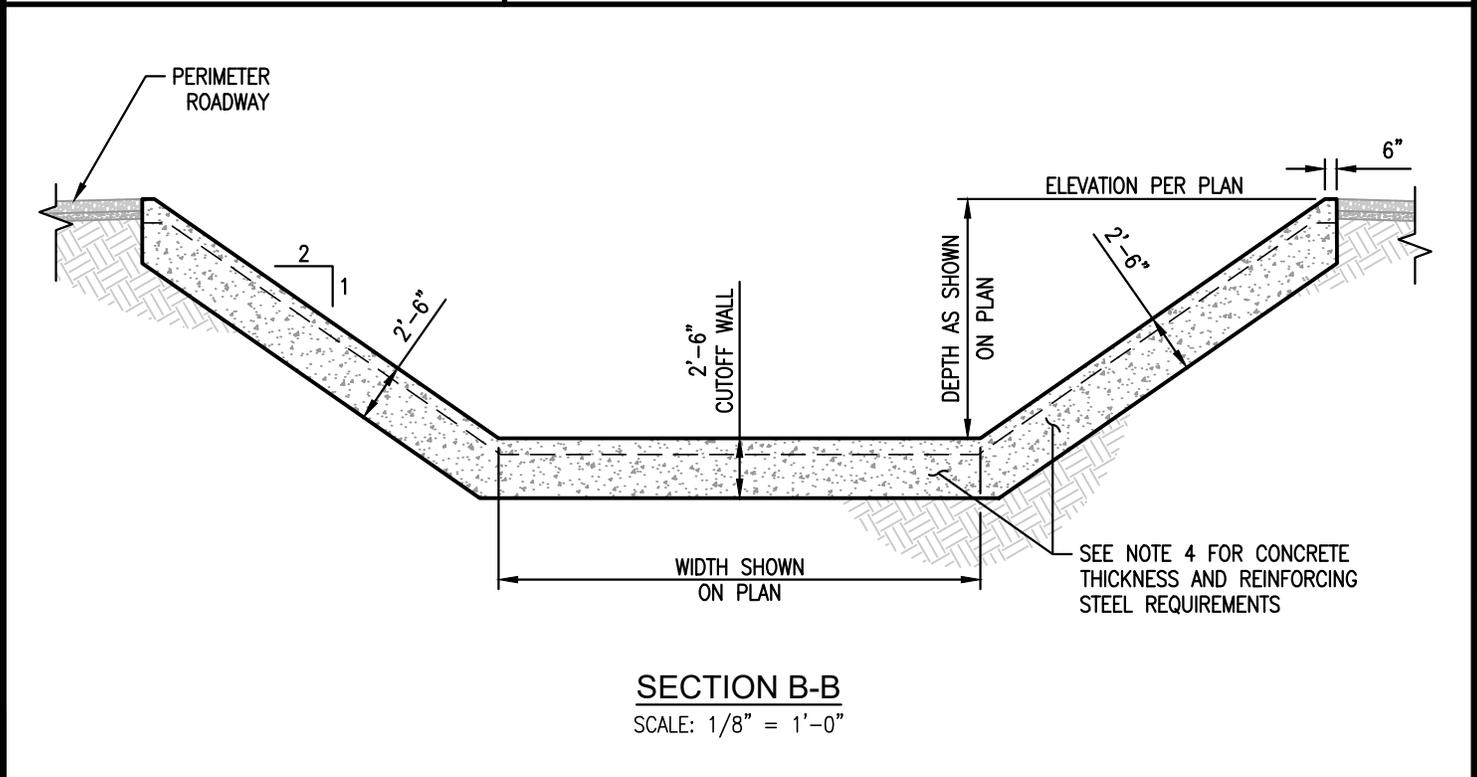
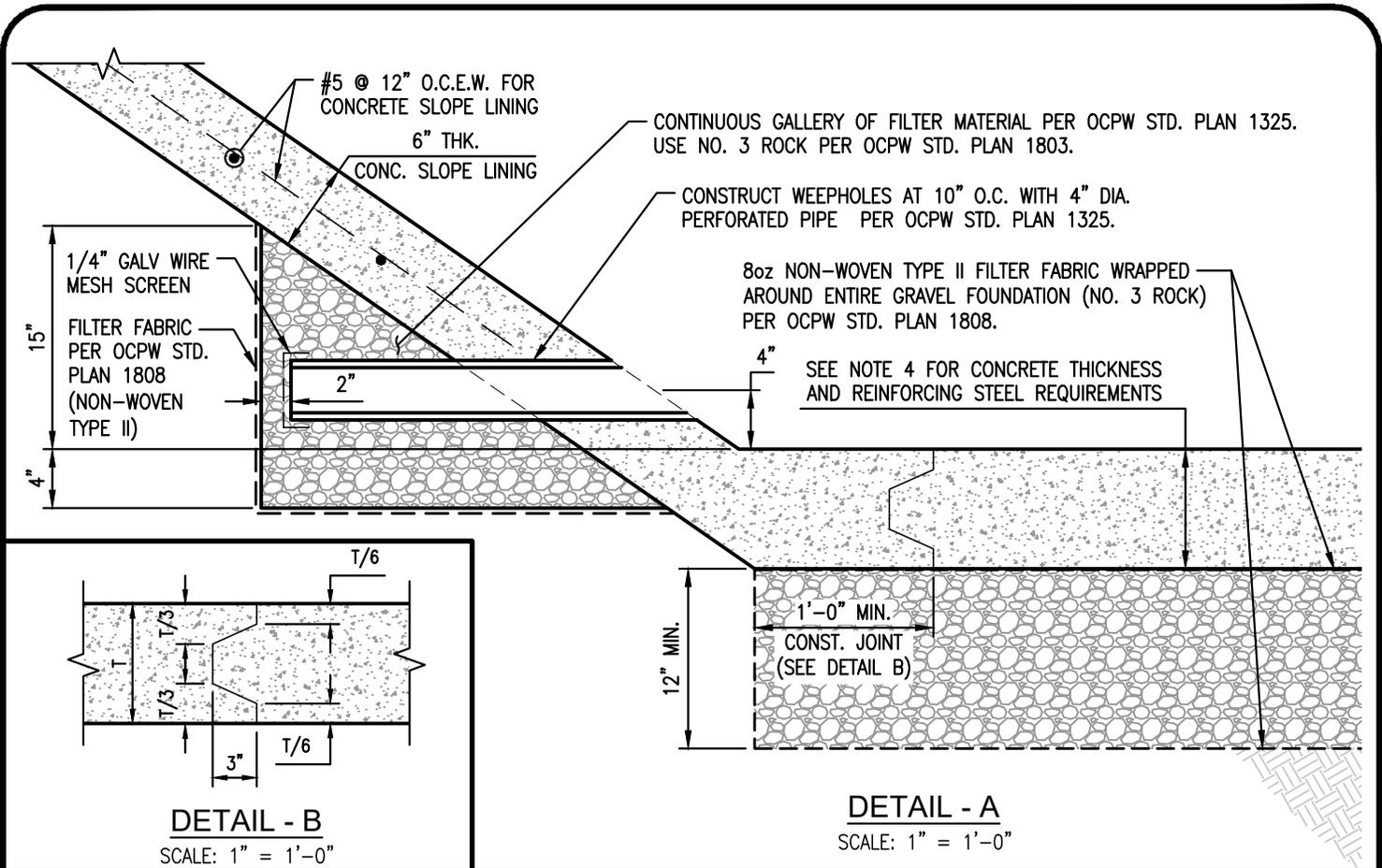
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STD. PLAN

1904

BASIN FOREBAY CONCRETE LINING AND END SILL WALL

SHT. 1 OF 5



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Kevin Onuma, County Engineer

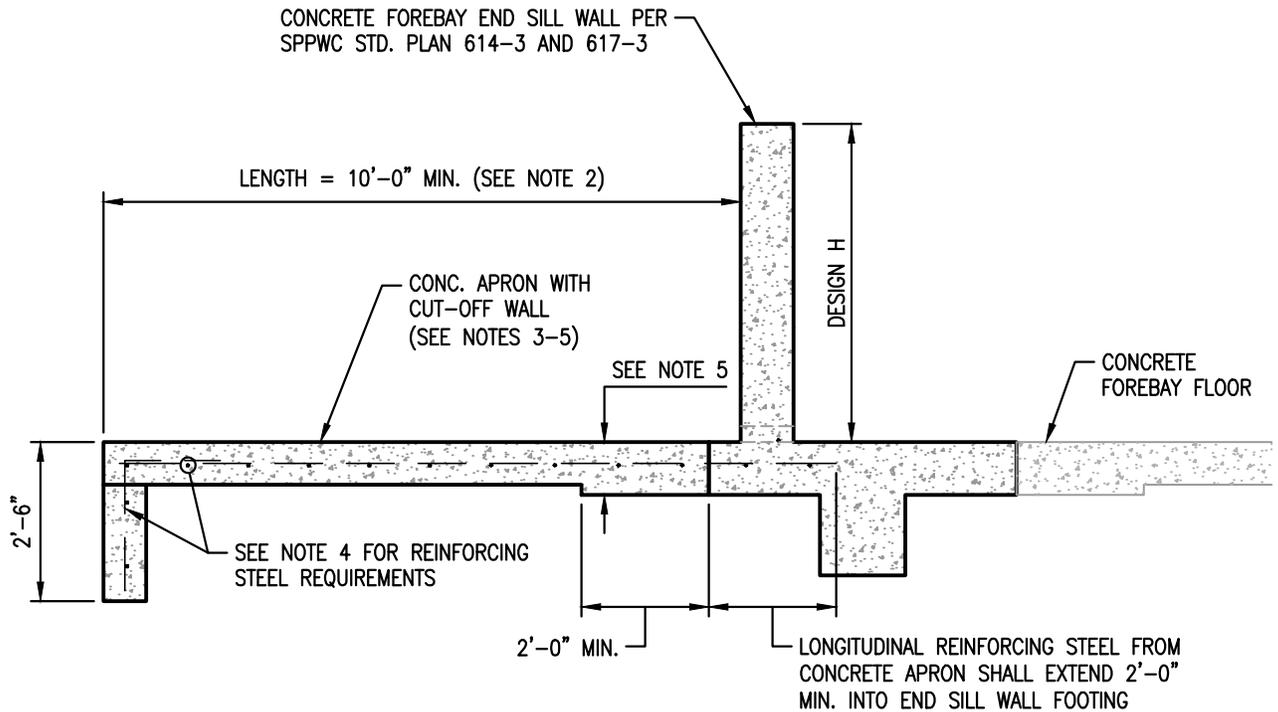
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STD. PLAN

1904

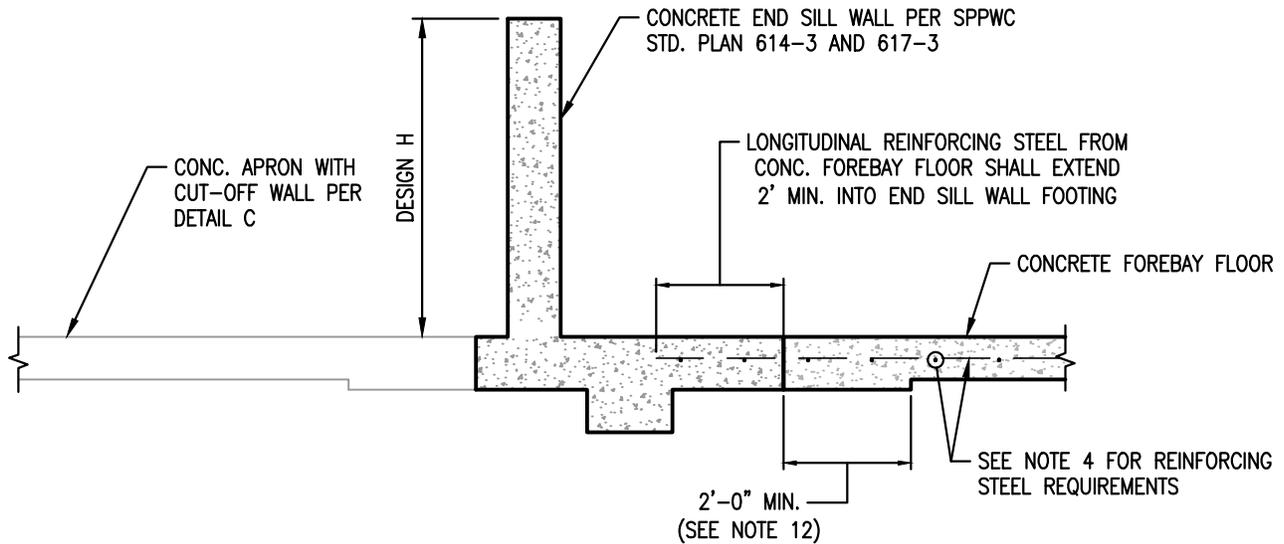
BASIN FOREBAY CONCRETE LINING AND END SILL WALL

SHT. 2 OF 5



SECTION C-C - CONCRETE APRON

N.T.S.



**DETAIL D - END SILL WALL
AT CONCRETE FOREBAY**

N.T.S.

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Kevin Onuma, County Engineer

May 2021

STD. PLAN

1904

BASIN FOREBAY CONCRETE LINING AND END SILL WALL

SHT. 3 OF 5

NOTES:

1. CONCRETE LINED FOREBAY SIDE SLOPES SHALL NOT EXCEED 2(H):1(V).
2. LENGTH OF CONCRETE APRON AND SIDE SLOPE TRANSITION DOWNSTREAM OF FOREBAY END SILL WALL SHALL BE TWICE THE DESIGN HEIGHT (H) OF THE END SILL WALL OR A MINIMUM OF 10' (WHICHEVER IS GREATER).
3. CONCRETE FOR FOREBAY SIDE SLOPES AND INVERT, APRON AND SIDE SLOPE TRANSITION SHALL BE 560-C-3250 PER GREENBOOK SPECIFICATIONS SECTION 201-1.1.2 AND CONFORM WITH THE REQUIREMENTS OF OCPW STD. PLAN 1803.
4. CONCRETE THICKNESS AND REINFORCING STEEL SIZE/SPACING SHALL BE DETERMINED BY DESIGNER BASED ON STRUCTURAL DESIGN REQUIREMENTS FOR HS-20 LOADING PER OCPW. ALL REINFORCING STEEL SHALL BE GRADE 60 IN ACCORDANCE WITH ASTM A615 PER OCPW STD. PLAN 1803.
5. THICKNESS OF CONCRETE APRON SHALL INCREASE TO MATCH THE THICKNESS OF THE END SILL WALL FOOTING (WHERE FOOTING THICKNESS EXCEEDS CONCRETE APRON THICKNESS). CHANGE IN CONCRETE APRON THICKNESS SHALL OCCUR ABRUPTLY AT A DISTANCE NO LESS THAN 2' FROM THE JUNCTION WITH THE END SILL WALL FOOTING.
6. GRAVEL BASE FOUNDATION PER OCPW STD. PLAN 1803 IS REQUIRED UNDERNEATH BOTTOM INVERT LINING. DEPTH OF FOUNDATION MATERIAL SHALL BE 12" MIN. AND SHALL BE CONFIRMED WITH THE PROJECT GEOTECHNICAL REPORT.
7. WEEPHOLES PER OCPW STD. PLAN 1325 ARE REQUIRED FOR SUBSURFACE DRAINAGE BEHIND CONCRETE SIDE SLOPES TO PREVENT BUILDUP OF HYDROSTATIC PRESSURE PER OCPW STD 1325
8. FOREBAY FLOOR SHALL HAVE LONGITUDINAL SLOPE (0.5% MIN.) TOWARD END SILL WALL.
9. BASIN FOREBAY SHALL BE DESIGNED TO CAPTURE MINIMUM PARTICLE SIZE, $D_{min} = 0.0625MM$, VIA SETTLING. MINIMUM PARTICLE SIZE SHALL SETTLE DISTANCE (H_w) BASED ON SETTLING VELOCITY (V_s) BEFORE IT TRAVELS LENGTH (L) BASED ON VELOCITY (U). DESIGNER SHALL VERIFY FOREBAY SHAPE AND DIMENSIONS ARE COMPATIBLE WITH SEDIMENT CAPTURE. FOREBAY SHAPE NEED NOT CONFORM TO EXAMPLE SHAPE SHOWN HEREON.
10. DESIGNER SHALL PROVIDE CALCULATIONS THAT DEMONSTRATE SUITABILITY OF FOREBAY TO CAPTURE SEDIMENT BASED ON STOKES LAW OR RUBEY'S EQUATION (SEE FIGURE 1 ON SHEET 5).
11. A 4-INCH (TYP.) WIDE NOTCH SHALL BE PROVIDED IN THE CENTER OF THE END SILL WALL TO ALLOW FOR OUTLETS OF LOW-FLOWS IN FOREBAY. NOTCH HEIGHT SHALL BE THE SAME AS END SILL WALL HEIGHT.
12. THICKNESS OF CONCRETE FOREBAY INVERT SHALL INCREASE TO MATCH THE THICKNESS OF THE END SILL WALL FOOTING (WHERE FOOTING THICKNESS EXCEEDS CONCRETE FOREBAY INVERT THICKNESS). CHANGE IN CONCRETE FOREBAY INVERT THICKNESS SHALL OCCUR ABRUPTLY AT A DISTANCE NO LESS THAN 2-FT FROM THE JUNCTION WITH THE END SILL WALL FOOTING.
13. SEE OCPW STANDARD PLAN 1906 FOR ACCESS RAMP REQUIREMENT AT FOREBAY.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved


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May 2021

STD. PLAN

1904

BASIN FOREBAY CONCRETE LINING AND END SILL WALL

SHT. 4 OF 5

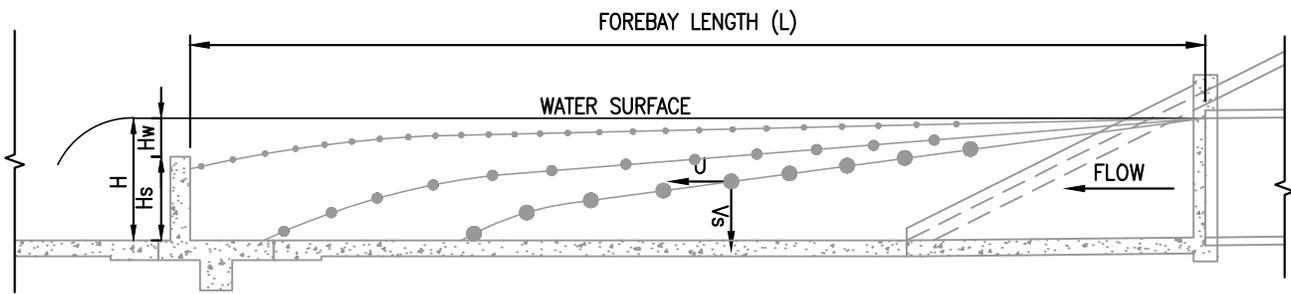


FIGURE 1 - SCHEMATIC OF FOREBAY DIMENSIONS FOR TRAPPING OF SEDIMENT PARTICLES OF DIFFERENT SIZES
N.T.S.

VARIABLES:

- H = HEIGHT OF WATER IN FOREBAY
- Hs = HEIGHT OF END SILL WALL
- Hw = HEIGHT OF WATER ABOVE END SILL WALL
- Vs = SETTLING VELOCITY OF SEDIMENT PARTICLE
- U = HORIZONTAL VELOCITY OF SEDIMENT PARTICLE

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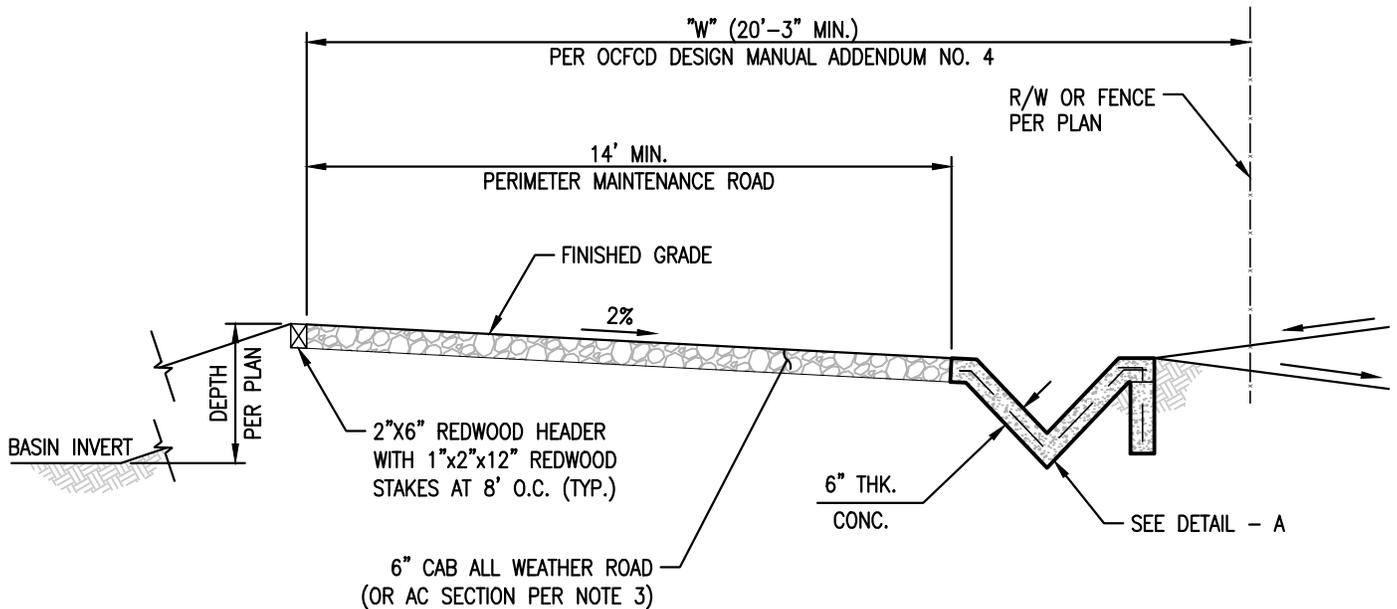
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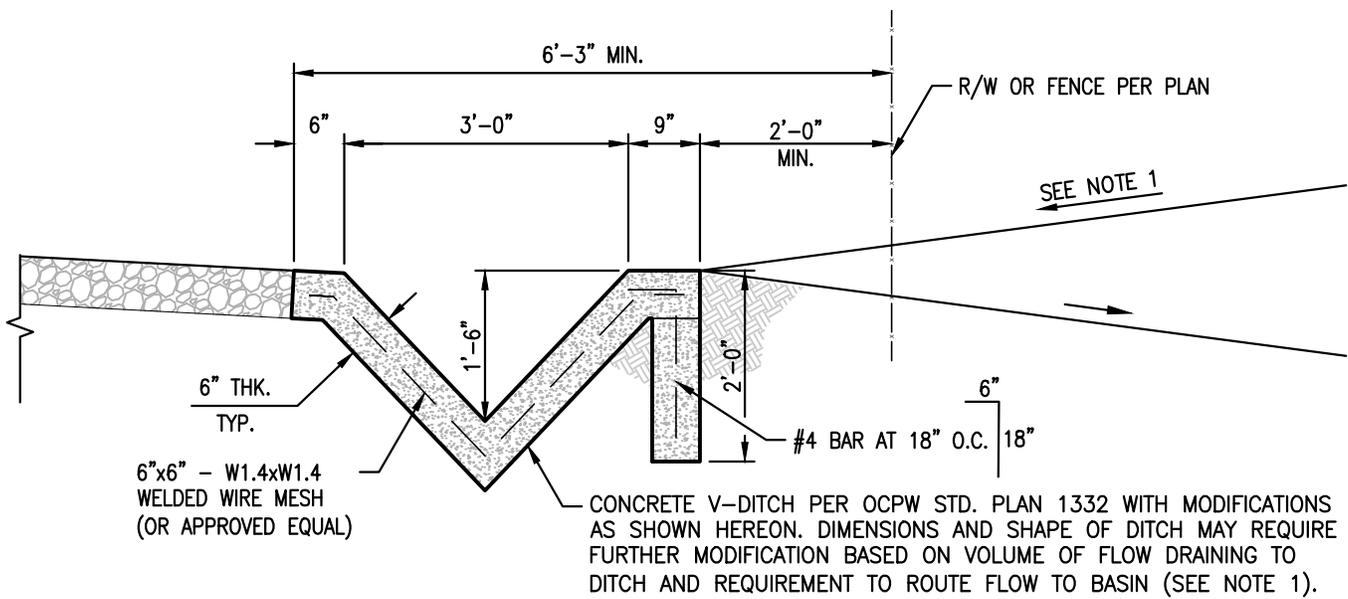
BASIN FOREBAY CONCRETE LINING AND END SILL WALL

SHT. 5 OF 5



BASIN PERIMETER MAINTENANCE ROAD

SCALE: 1/4" = 1'-0"



DETAIL - A

SCALE: 1/2" = 1'-0"

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1905

BASIN PERIMETER MAINTENANCE ROAD & V-DITCH

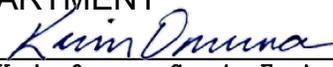
SHT. 1 OF 2

NOTES:

1. THE DRAINAGE AREA, INCLUDING THE BASIN PERIMETER ROADWAY, CONTRIBUTING RUNOFF TO THE V-DITCH MUST BE DELINEATED AS A DRAINAGE MANAGEMENT AREA (DMA) ACCORDING TO THE APPLICABLE TGD FOR THE PROJECT. IF THE TGD INDICATES THE USE OF A STORMWATER BMP FOR THIS DMA, RUNOFF FROM THE V-DITCH MAY BE DIRECTED INTO THE BASIN, AND THE BASIN MUST THEN BE SIZED APPROPRIATELY FOR THE BMP DESIGN VOLUME AND 100-YEAR Q FROM THE DMA TRIBUTARY TO THE V-DITCH.
2. A 14' WIDE (MIN.) ALL WEATHER PERIMETER ACCESS ROAD SHALL BE PROVIDED WITHIN A 20'-3" (MIN) HORIZONTAL CLEAR AREA ADJACENT TO THE BASIN PER OCFCD DESIGN MANUAL ADDENDUM NO. 4.
3. ASPHALT CONCRETE ROAD SECTION SHALL BE DESIGNED BASED ON HS-20 LOADING PER OCPW REQUIREMENTS.
4. ASPHALT CONCRETE SHALL BE PER GREENBOOK SECTION 203-6 AND CRUSHED AGGREGATE BASE SHALL BE PER GREENBOOK SECTION 200-2.2.
5. THE MINIMUM TOP WIDTH FOR THE CONCRETE V-DITCH IS 3.0 FEET PER THE OCPW STANDARD PLAN 1332.
6. REINFORCING STEEL SHALL BE GRADE 60 PER ASTM A615 AND PER OCPW STANDARD PLAN 1803.
7. CONCRETE FOR V-DITCH SHALL BE TYPE II OR IV, CLASS 520-C-2500 OR 520-C-2500P (IF PUMPED) AND SHALL CONFORM TO THE REQUIREMENTS OF OCPW STD. PLAN 1332 AND 1803.

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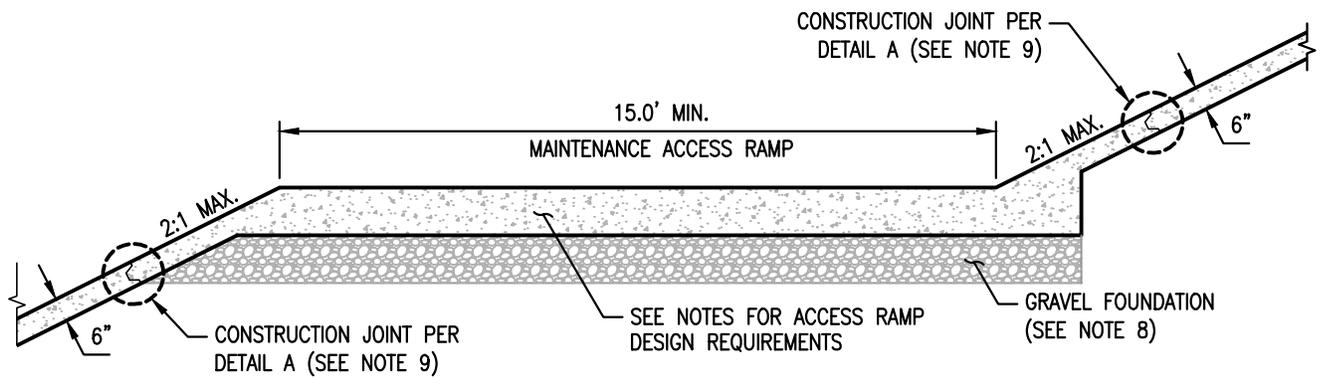
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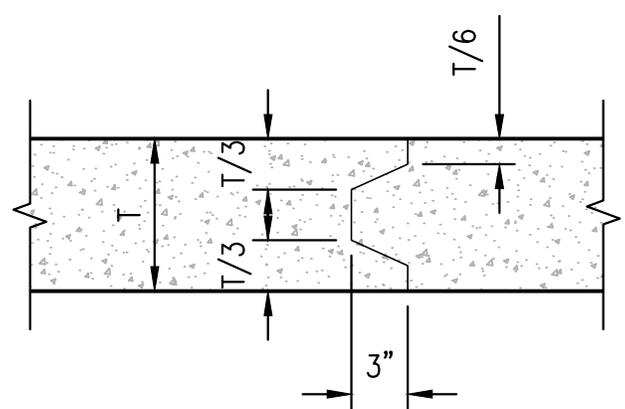
1905

BASIN PERIMETER MAINTENANCE ROAD & V-DITCH

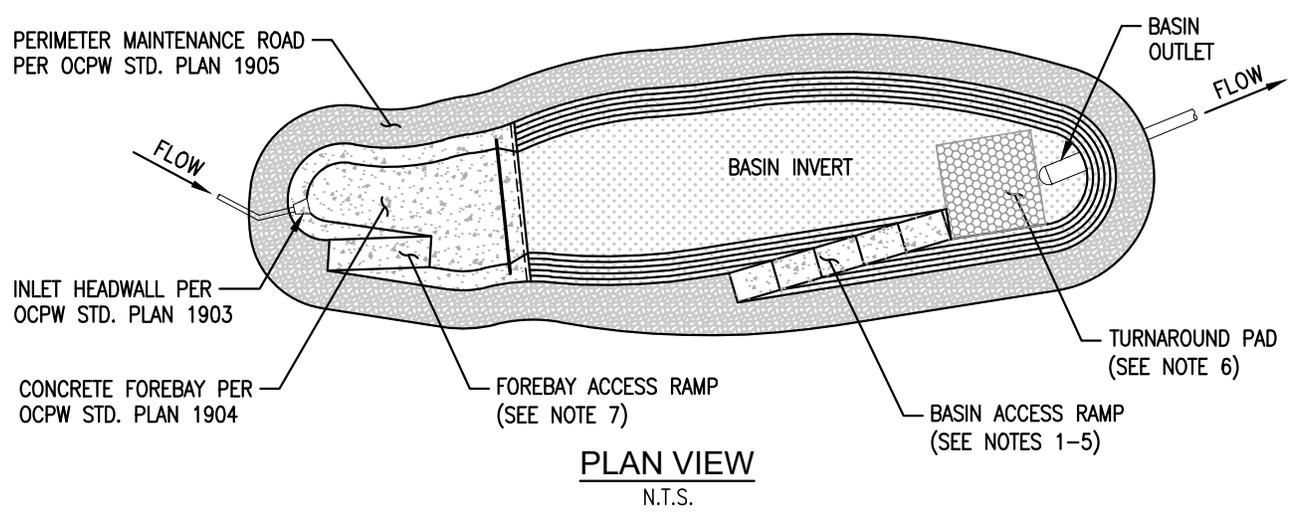
SHT. 2 OF 2



FOREBAY ACCESS RAMP SECTION
SCALE: 1/4" = 1'-0"

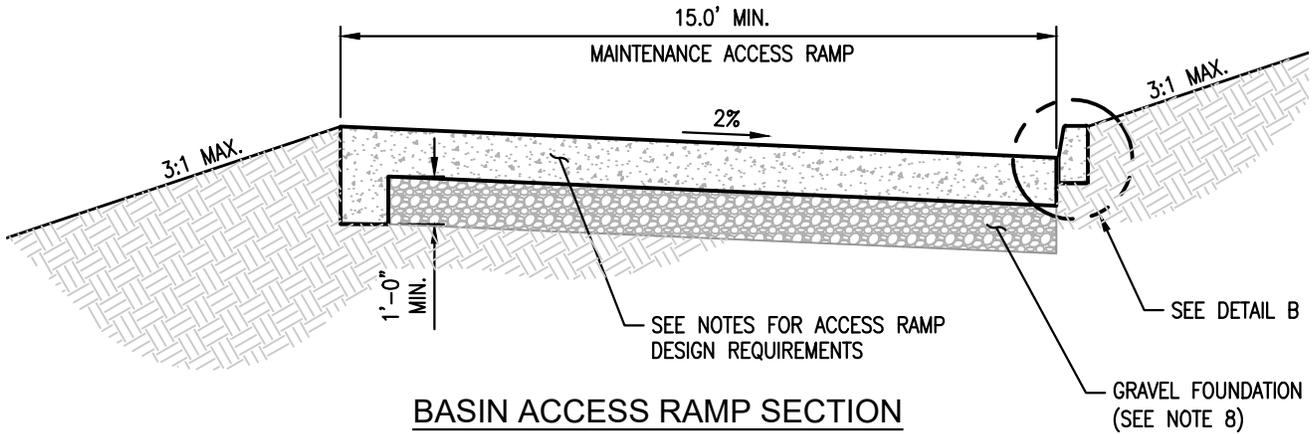


DETAIL A
SCALE: 1" = 1'-0"



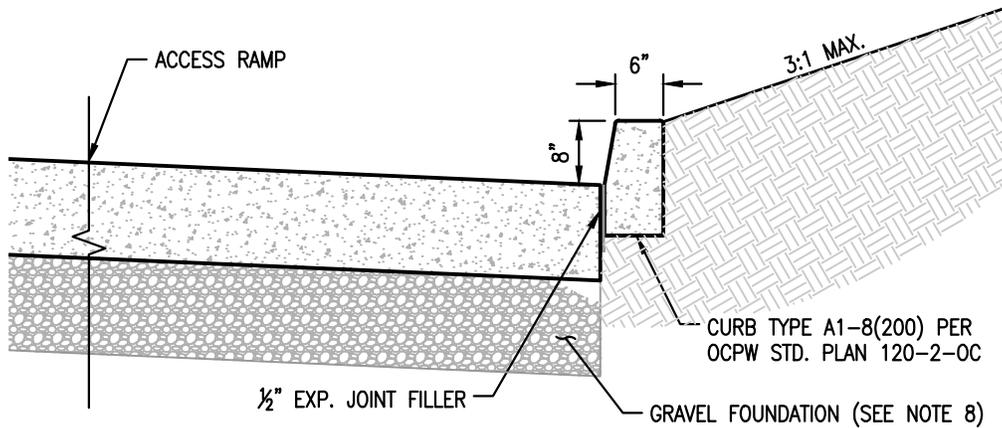
PLAN VIEW
N.T.S.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT Approved <i>Kevin Onuma</i> Kevin Onuma, County Engineer		STD. PLAN 1906 SHT. 1 OF 3
May 2021	BASIN CONCRETE MAINTENANCE ACCESS RAMP	



BASIN ACCESS RAMP SECTION

SCALE: 1/4" = 1'-0"



DETAIL B

SCALE: 1/2" = 1'-0"

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Kevin Onuma, County Engineer

May 2021

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1906

BASIN CONCRETE MAINTENANCE ACCESS RAMP

SHT. 2 OF 3

NOTES:

1. A MINIMUM OF ONE ACCESS RAMP IS REQUIRED FOR ALL BASINS. ADDITIONAL RAMPS MAY BE REQUIRED BASED ON BASIN SIZE/CONFIGURATION.
2. ACCESS RAMPS SHALL HAVE A MAXIMUM 10% GRADE AND MINIMUM CROSS-SLOPE OF 2% PER OCFCD DESIGN MANUAL ADDENDUM NO. 4. RAMP SHALL SLOPE AWAY FROM BASIN.
3. CONCRETE FOR ACCESS RAMPS SHALL BE 560-C-3250 PER GREENBOOK SPECIFICATIONS SECTION 201-1.1.2 AND SHALL CONFORM TO THE REQUIREMENTS OF OCPW STD. PLAN 1803. CONCRETE SURFACE SHALL HAVE A TRANSVERSE RAKED FINISH.
4. CONCRETE THICKNESS AND REINFORCING STEEL SIZE/SPACING SHALL BE DETERMINED BY DESIGNER BASED ON STRUCTURAL DESIGN REQUIREMENTS FOR HS-20 LOADING PER OCPW.
5. REINFORCING STEEL SHALL BE GRADE 60 IN ACCORDANCE WITH ASTM A615 PER OCPW STD. PLAN 1803.
6. A 50' x 50' TURNAROUND PAD SHALL BE PROVIDED AT END OF ACCESS RAMP ADJACENT TO BASIN OUTLET LOCATION. TURNAROUND PAD SHALL BE CONSTRUCTED USING TURF BLOCKS (PER MANUFACTURER SPECIFICATIONS) OR EQUIVALENT TO BE APPROVED BY OCPW.
7. A MINIMUM OF ONE ACCESS RAMP IS REQUIRED IN THE FOREBAY. WHERE FOREBAY SIZE ALLOWS, ACCESS RAMP SHALL BE PLACED TO ALLOW VEHICULAR ACCESS FROM RAMP TO FOREBAY.
8. GRAVEL BASE FOUNDATION SHALL BE NO. 3 ROCK (12" MIN. LAYER THICKNESS) WRAPPED IN FABRIC PER OCPW STD. PLAN 1803 AND 1808. OR EQUIVALENT PER PROJECT GEOTECHNICAL ENGINEER RECOMMENDATION.
9. LOCATION OF CONSTRUCTION JOINTS SHALL BE DETERMINED BY DESIGNER PER STRUCTURAL DESIGN REQUIREMENTS BASED ON ACCESS RAMP THICKNESS.

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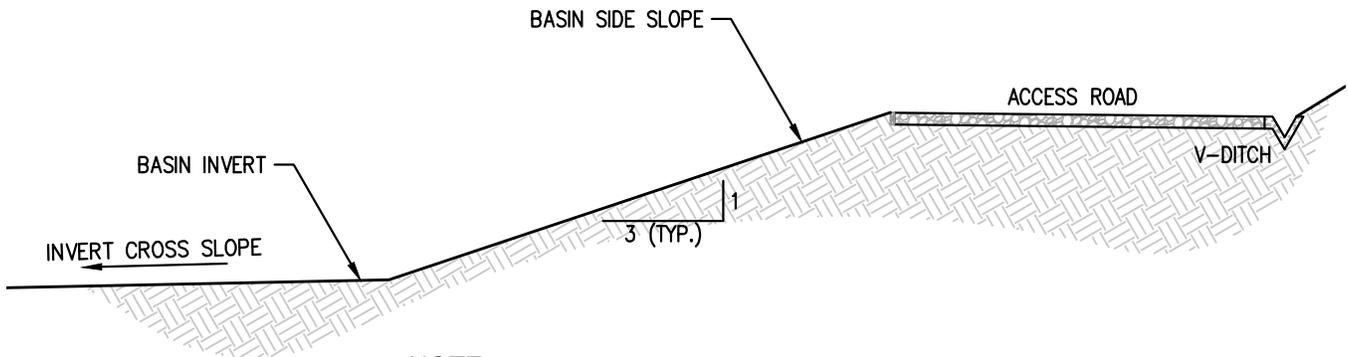
May 2021

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1906

BASIN CONCRETE MAINTENANCE ACCESS RAMP

SHT. 3 OF 3



NOTE:
SEE TABLE ON SHEET 4 FOR BASIN REQUIREMENTS.

BASIN SECTION

SCALE: 1/8" = 1'-0"

BASIN SIDE SLOPE VEGETATION:

INSTALL A NATIVE OR CLIMATE-APPROPRIATE NON-INVASIVE SPECIES EROSION CONTROL SEED MIX WITH TACKIFIER (FLEXTERRA HIGH PERFORMANCE – FLEXIBLE GROWTH MEDIUM (HP-FGM) SEED WITH S&S BASIC EROSION CONTROL SEED MIX OR EQUAL). SEED MIX TO BE CONFIRMED BASED ON GEOGRAPHIC LOCATION & CLIMATE ZONE (HABITAT CONSERVATION PLAN SUB-REGION) PRIOR TO APPLICATION. NO MULCH.

BASIN INVERT VEGETATION:

BASIN INVERT VEGETATION TO BE INSTALLED PER OPTION A: LIVE PLANTS AND MULCH (SEE SHEET 2), OR OPTION B: SEED (SEE SHEET 3).

BASIN SLOPES & VEGETATION REQUIREMENTS:

1. BASIN SIDE SLOPES VEGETATED TO PROVIDE SOIL STABILIZATION AND EROSION CONTROL AS WELL AS AESTHETICS.
2. BIOINFILTRATION BASIN FLOOR VEGETATED TO PROVIDE BIOLOGICAL UPTAKE FOR POLLUTANT REMOVAL.
3. INFILTRATION BASIN, HYDROMOD CONTROL BASIN, AND COMBO BASINS VEGETATED ON FLOOR TO STABILIZE SOIL.
4. PLANTING SHALL BE NATIVE VEGETATION SUITABLE FOR BASIN SOIL, HYDROLOGY, AND LOCATION.

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Kevin Onuma, County Engineer

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BASIN SLOPES & VEGETATION REQUIREMENTS

SHT. 1 OF 4

BASIN INVERT PLANTING OPTION A: LIVE PLANTINGS WITH MULCH

1. LIVE PLANTS (PLUGS) SHALL BE INSTALLED ON A GRID RECOMMENDED BY THE DESIGNER, BASED ON PLANT SPECIES TO ACHIEVE MAXIMUM MATURE VEGETATED COVERAGE OF THE BASIN INVERT. USE LOCALLY SOURCED PLANTS WHERE AVAILABLE.
2. PLANT PALETTE MAY BE SUBSTITUTED WITH APPROVAL OF COUNTY.
3. MULCH LAYER TO BE INSTALLED CONTINUOUSLY OVER ENTIRE BASIN INVERT.
4. MULCH TO BE NON-FLOATING HARDWOOD MULCH PER OCPW STANDARD PLAN 1908.
5. PLANT PALETTE DETERMINED BY THE DESIGNER BASED ON PROJECT CLIMATE CONDITIONS.

VEGETATION COVERAGE REQUIREMENTS:

VEGETATION GROWTH IS TO BE ESTABLISHED WITH 70%* VEGETATION COVERAGE OF BASIN SIDE SLOPES AND INVERT AT COMPLETION OF WARRANTY PERIOD. THE BASIN BUILDER/SPONSOR MAY ELECT TO PROMOTE GROWTH VIA PERIODIC WATERING (PRIMARILY DURING WINTER AND SPRING). IN THE EVENT THAT NATURAL RAINS DO NOT PROMOTE VEGETATION GROWTH, THE BASIN BUILDER/SPONSOR SHALL MAKE APPROPRIATE PERIODIC "BALD SPOT" SEED REPLACEMENT ON BASIN SIDES OR LIVE PLANT REPLACEMENT ON BASIN BOTTOM TO SATISFY THE WARRANTY PERIOD COVERAGE OF 70% IN ORDER TO CONCLUDE THE WARRANTY PERIOD. ESTABLISHMENT OF SEED REQUIRES 70% COVERAGE AND PLANTS NOT EASILY PULLED FROM SOIL.

* COVERAGE STANDARD REFERENCED FROM CONSTRUCTION GENERAL PERMIT REGULATIONS REQUIRING FINAL STABILIZATION ON 70% OF DISTURBED SOILS.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

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May 2021

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1907

BASIN SLOPES & VEGETATION REQUIREMENTS

SHT. 2 OF 4

BASIN INVERT PLANTING OPTION B: SEED

BASIN FLOOR MAY BE SEEDED USING SEED, HYDROSEED OR HYDROMULCH WITH SEED. SEED MIX TO BE APPLIED TO 100% OF THE BASIN INVERT.

INSTALL THE FOLLOWING SEED MIX, OR A CLIMATE APPROPRIATE EQUIVALENT (EACH ITEM TO BE LISTED IN POUNDS PER ACRE): SEED MIX TO BE CONFIRMED, BASED ON GEOGRAPHIC LOCATION & CLIMATE ZONE (HABITAT CONSERVATION PLAN SUB-REGION) PRIOR TO APPLICATION. USE LOCALLY SOURCED SEED WHERE AVAILABLE.

1. STACHYS BULLATA (3 LBS)
2. AMBROSIA PSILOSTACHY (3 LBS)
3. JUNCUS PATENS (3 LBS)
4. CAREX PRAEGRACILIS (2 LBS)
5. FESTUCA RUBRA (4 LBS)
6. HELIOTROPIUM CURASSAVICUM (2 LBS)
7. PLANTAGO ERECTA (4 LBS)
8. MALVELLA LEPROSA (2 LBS)
9. CRESSA TRUXILLENIS (2 LBS)

PLANT ESTABLISHMENT PER SPECIFICATION HEREON REQUIRED PRIOR TO BASIN BEING PUT INTO SERVICE

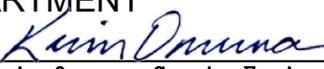
VEGETATION COVERAGE REQUIREMENTS:

VEGETATION GROWTH IS TO BE ESTABLISHED WITH 70%* VEGETATION COVERAGE OF BASIN SIDE SLOPES AND INVERT AT COMPLETION OF WARRANTY PERIOD. THE BASIN BUILDER/SPONSOR MAY ELECT TO PROMOTE GROWTH VIA PERIODIC WATERING (PRIMARILY DURING WINTER AND SPRING). IN THE EVENT THAT NATURAL RAINS DO NOT PROMOTE VEGETATION GROWTH, THE BASIN BUILDER/SPONSOR SHALL MAKE APPROPRIATE PERIODIC "BALD SPOT" SEED REPLACEMENT TO SATISFY THE WARRANTY PERIOD COVERAGE OF 70% IN ORDER TO CONCLUDE THE WARRANTY PERIOD. ESTABLISHMENT OF SEED REQUIRES 70% COVERAGE AND PLANTS NOT EASILY PULLED FROM SOIL.

* PERCENT REFERENCED FROM CONSTRUCTION GENERAL PERMIT REGULATIONS REQUIRING FINAL STABILIZATION ON 70% OF DISTURBED SOILS.

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May 2021

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BASIN SLOPES & VEGETATION REQUIREMENTS

SHT. 3 OF 4

DESIGN CRITERIA	BIOINFILTRATION BASIN	INFILTRATION BASIN	HYDROMODIFICATION CONTROL BASIN
BASIN GEOMETRY			
CONCRETE FOREBAY SIDE SLOPES	2(H):1(V) MAX.	2(H):1(V) MAX.	2(H):1(V) MAX.
BASIN SIDE SLOPES	3(H):1(V) MAX.	3(H):1(V) MAX.	3(H):1(V) MAX.
INVERT CROSS SLOPE (MIN)	0%	0%	2% (TOWARD UNDERDRAIN)
INVERT LONG SLOPE (MAX)	0%	0%	1%
UNDERDRAIN			
	REQUIRED	NOT ALLOWED	OPTIONAL
VEGETATION			
FOREBAY	N/A	N/A	N/A
BASIN SIDE SLOPE	SEE SEED MIX ON SHEET 1	SEE SEED MIX ON SHEET 1	SEE SEED MIX ON SHEET 1
BASIN INVERT	LIVE PLANTINGS (PLUGS) WITH MULCH PER OPTION A ON SHEET 2 OR SEED PER OPTION B ON SHEET 3	SEED PER OPTION B ON SHEET 3 OR APPROVED ALTERNATIVE	SEED PER OPTION B ON SHEET 3 OR APPROVED ALTERNATIVE
IRRIGATION REQUIREMENTS			
BASIN SIDE SLOPE	TEMPORARY (AS-NEEDED FOR VEGETATION ESTABLISHMENT)	TEMPORARY (AS-NEEDED FOR VEGETATION ESTABLISHMENT)	TEMPORARY (AS-NEEDED FOR VEGETATION ESTABLISHMENT)
BASIN INVERT	TEMPORARY (AS-NEEDED FOR VEGETATION ESTABLISHMENT)	TEMPORARY (AS-NEEDED FOR VEGETATION ESTABLISHMENT)	TEMPORARY (AS-NEEDED FOR VEGETATION ESTABLISHMENT)
MULCH (BASIN INVERT ONLY)	NON-FLOATING HARDWOOD MULCH OR SEED PER PLANTING OPTION A OR OPTION B	NOT REQUIRED	NOT REQUIRED

NOTES:

1. VEGETATION MUST MEET COVERAGE REQUIREMENTS PROVIDED ON THIS DETAIL AND IN THE OCPW BASIN CONSTRUCTION SPECIFICATIONS/FINAL INSPECTION DOCUMENT.
2. COMBINATION BASINS ARE AN LID BASIN (BIOINFILTRATION BASIN OR INFILTRATION BASIN) WITH A HYDROMODIFICATION CONTROL FUNCTION. COMBINATION BASIN FEATURES SHOWN ON THIS TABLE WILL BE BASED ON THE LID BASIN TYPE.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved 
Kevin Onuma, County Engineer

May 2021

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BASIN SLOPES & VEGETATION REQUIREMENTS

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NOTES:

1. BIORETENTION SOIL MEDIA (BSM) AND MULCH LAYERS SHALL BE IN ACCORDANCE WITH OCPW STANDARD PLANS 1907 AND 1910.
2. FILTER COURSE, GRAVEL LAYER AND SLOTTED UNDERDRAIN PIPE SHALL BE IN ACCORDANCE WITH OCPW STANDARD PLAN 1909 AND PER DETAILS SHOWN HEREON.
3. ACTUAL DIMENSIONS FOR BIORETENTION SOIL MEDIA LAYER THICKNESS AND SLOTTED UNDERDRAIN PIPE DIAMETER TO BE SPECIFIED ON PROJECT PLANS BASED ON DESIGN CALCULATIONS.
4. BIOFILTRATION BASIN BED PROFILE BEGINNING AT THE TOP CONSISTS OF (1) MULCH (AS REQUIRED), (2) BSM, (3) FILTER COURSE, AND (4) INFILTRATION STORAGE LAYER.
5. FULL BASIN VOLUME SHOULD BE DESIGNED FOR 48 HOUR DRAWDOWN. DRAWDOWN TIME MAY BE CONTROLLED BY BSM INFILTRATION RATE OR THROTTLED DOWN THROUGH AN OUTLET CONTROL (NOT SHOWN IN OCPW STANDARD PLAN 1909). BSM DESIGN INFILTRATION RATE WILL DEPEND ON DRAWDOWN CONTROL METHOD.
6. WHEN BSM INFILTRATION RATE CONTROLS DRAWDOWN RATE, INFILTRATION RATES FOR THE BSM OF BETWEEN 2.0 TO 4.0 INCHES PER HOUR. TESTING OF SOIL SHALL BE CONSISTENT WITH SECTION 6 OF OCPW STANDARD PLAN 1910. TARGET INFILTRATION RATES SHOULD NOT EXCEED 4.0 INCHES PER HOUR FOR ADEQUATE WATER RETENTION.
7. WHEN DRAWDOWN TIME CONTROLLED BY ORIFICE/VALVE ON UNDERDRAIN, BSM INFILTRATION RATE SHOULD BE 20 TO 40 INCHES PER HOUR (SEE SECTION 6 OF OCPW STANDARD PLAN 1910).
8. INFILTRATION STORAGE LAYER SHALL BE PROTECTED BY FILTER COURSE TO TRAP SEDIMENT FROM CLOGGING PORES USED FOR WATER STORAGE. FILTER COURSE PER DETAIL. NO GEOTEXTILE FILTER FABRIC SHALL BE USED.
9. MINIMUM BSM DEPTH IS 18 INCHES, THREE FEET PREFERRED.
10. DEPTH OF THE INFILTRATION STORAGE LAYER BELOW THE UNDERDRAIN ELEVATION MUST BE SUFFICIENT THAT THE "EFFECTIVE STORAGE DEPTH" WILL DRAIN IN 48 HOURS CALCULATED USING THE AVERAGE INFILTRATION RATE OF THE UNDERLYING SOIL. MINIMUM OF 18 INCHES.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

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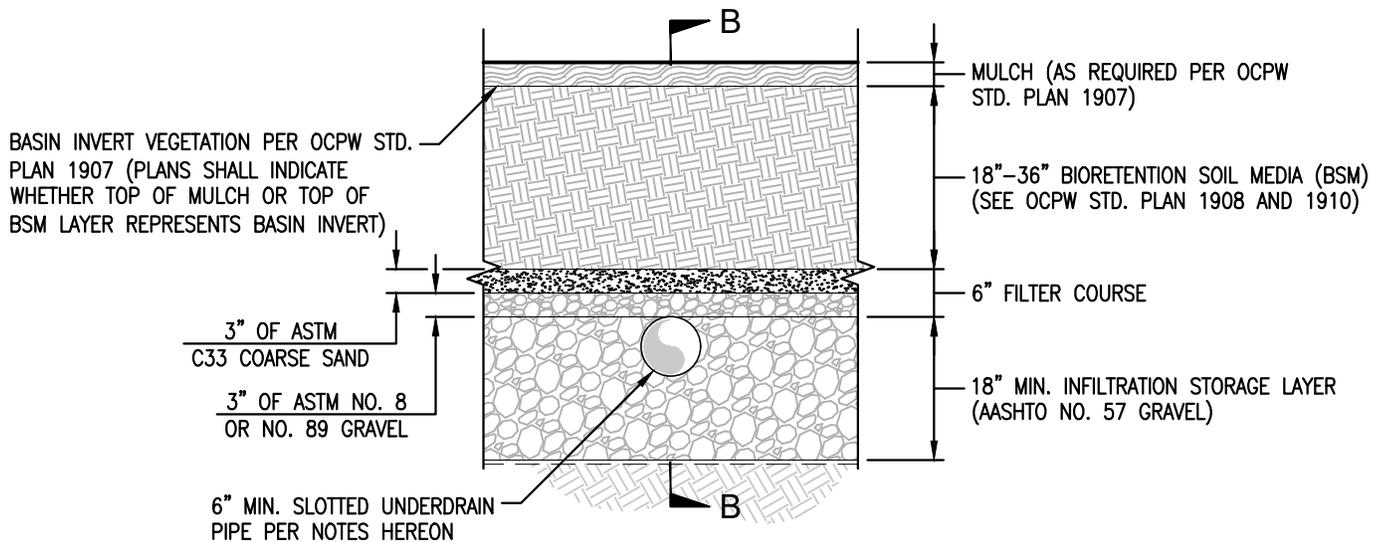
May 2021

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1908

BIOINFILTRATION BASIN TREATMENT SECTION

SHT. 2 OF 2



SECTION A-A

SCALE: 1/2" = 1'-0"

NOTES:

1. FILTER COURSE AND SLOTTED UNDERDRAIN PIPE DESIGN

- 1.1. TO KEEP THE MEDIA PARTICLES FROM MIGRATING INTO THE AGGREGATE GRAVEL LAYER, A FILTER COURSE IS USED. WHILE GEOTEXTILE FILTER FABRICS HAVE BEEN USED IN THE PAST AT THE INTERFACE OF THE SOIL MEDIA AND GRAVEL AGGREGATE LAYERS, EXPERIENCE HAS SHOWN THAT FILTER FABRIC IS A COMMON POINT OF FAILURE IN STORMWATER BMPS, EITHER BY CLOGGING, OR BY ALLOWING MEDIA TO MIGRATE INTO THE UNDERDRAIN SYSTEM. A 'BRIDGING' OR 'CHOKING' LAYER (FILTER COURSE) IS PREFERRED TO SEPARATE THE INFILTRATION STORAGE LAYER AND THE SOIL MEDIA. THIS APPROACH CONSISTS OF PROGRESSIVELY GRADED LAYERS THAT PROGRESS FROM FINER TO COARSER MATERIALS MOVING FROM TOP TO BOTTOM.
- 1.2. THIS FILTER COURSE CONSISTS OF A COARSE SAND LAYER, UNDERLAIN BY PEA GRAVEL. THE FILTER COURSE IS UNDERLAIN BY THE INFILTRATION STORAGE LAYER. AS LONG AS THE RECOMMENDATIONS BELOW ARE USED FOR THE FILTER COURSE AND INFILTRATION STORAGE LAYER, THEN NO CALCULATIONS ARE NEEDED TO DEMONSTRATE THE ADEQUACY OF THE FILTER COURSE.
- 1.3. SEE OCPW STANDARD PLAN 1908 FOR DETAILS.

2. RECOMMENDED FILTER COURSE AND INFILTRATION STORAGE LAYER DESIGN

- 2.1. THE RECOMMENDED DESIGN FOR THE FILTER COURSE IS SHOWN BELOW. IT CONSISTS OF 3 INCHES OF ASTM C33 COARSE SAND AT THE BOTTOM OF THE MEDIA LAYER, UNDERLAIN BY 3 INCHES OF ASTM NO. 8 OR NO. 89 GRAVEL. THE DESIGN ASSUMES THAT THE INFILTRATION STORAGE LAYER CONSISTS OF AASHTO NO. 57 GRAVEL. THE GRADATION LIMITS TO MEET THE STANDARD CLASSIFICATIONS ARE SHOWN IN THE TABLES BELOW. IF THE PROJECT PROPOSES SIGNIFICANTLY DIFFERENT GRADATIONS OF ANY LAYER, THEN CALCULATIONS SHOWING THAT THE FILTER COURSE IS ADEQUATE ARE REQUIRED.

3. SLOTTED UNDERDRAIN PIPE

- 3.1. UNDERDRAINS SHALL BE SLOTTED, SCHEDULE 40 PVC PIPE CONFORMING TO ASTM D 3034 OR EQUIVALENT OR CORRUGATED, HDPE PIPE CONFORMING TO AASHTO 252M OR EQUIVALENT. SCHEDULE 80 PVC PIPE MAY BE REQUIRED AT THE DISCRETION OF OCPW.
- 3.2. SLOTS SHALL BE 4-6 ROWS CUT PERPENDICULAR TO THE AXIS OF THE PIPE OR RIGHT ANGLES TO THE PITCH OF CORRUGATIONS.
- 3.3. SLOTS SHALL BE 0.04 TO 0.1 INCHES WIDE AND 1 TO 1.25 INCHES LONG AND SHALL BE LOCATED WITHIN LOWER THIRD OF PIPE.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

May 2021

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BIOINFILTRATION BASIN FILTER COURSE, STORAGE LAYER, & UNDERDRAIN

SHT. 1 OF 3

NOTES: (CONT.)

- 3.4. SLOTS SHALL BE LONGITUDINALLY SPACED SUCH THAT THE PIPE HAS A MINIMUM OF 2 SQUARE INCHES OF "SLOT OPEN AREA" IN EACH LINEAL FOOT OF PIPE.
- 3.5. SLOT SPACE IS COMPUTED AS THE PRODUCT OF THE LENGTH, WIDTH, NUMBER OF ROWS, AND NUMBER OF SLOTS PER ROW IN 1 FOOT OF PIPE. FOR EXAMPLE, A PIPE CONTAINING 6 ROWS OF 1"x0.067" SLOTS WITH 12 SLOTS PER LINEAL FOOT OF PIPE WOULD HAVE AN OPEN AREA OF 6x12x1"x0.067" = 4.8 SQ-INCH OPEN AREA PER LINEAL FOOT OF PIPE.
- 3.6. UNDERDRAIN PIPE MUST BE SIZED USING MINIMUM OF 6 INCH DIAMETER SLOTTED PVC PIPE AND MINIMUM SLOPE OF 0.5 PERCENT WRAPPED WITH UTILITY TRACE WIRE. PIPE SHALL CONFORM TO TGD FACT SHEET MISC-3.
- 3.7. UNDERDRAIN PIPES SHALL BE SPACED AS NEEDED FOR HYDRAULIC DESIGN.
- 3.8. INSTALL A MINIMUM OF TWO CLEANOUTS ON EACH SUBDRAIN PIPE; ONE CLEANOUT AT THE UPSTREAM END AND ONE AT THE DOWNSTREAM END. OBSERVATION PORT REQUIRED EVERY 100 TO 200 FT.
- 3.9. UNDERDRAIN SOFFIT AT THE TOP OF THE INFILTRATION STORAGE LAYER.

GRADATION LIMITS FOR ASTM C33 COARSE SAND

SIEVE SIZE	PERCENT OF PARTICLES SMALLER THAN SIEVE SIZE
0.375" in.	100
No. 4 (0.187 in.)	95-100
No. 8 (0.093 in.)	80-100
No. 16 (0.046 in.)	50-85
No. 30 (0.024 in.)	25-60
No. 50 (0.012 in.)	5-30
No. 100 (0.006 in.)	0-10
No. 200 (0.003 in.)	0 [FINES SHOULD NOT BE PRESENT IN WASHED STONE]

GRADATION LIMITS FOR ASTM No. 8 PEA GRAVEL OR No. 89 GRAVEL (AKA 3/8" STONE)

SIEVE SIZE	PERCENT OF PARTICLES SMALLER THAN SIEVE SIZE
0.5" in.	100
0.375" in.	95-100
No. 4 (0.187 in.)	10-30
No. 8 (0.093 in.)	0-10
No. 16 (0.046 in.)	0-5

GRADATION LIMITS FOR AASHTO No. 57 AGGREGATE GRAVEL (AKA 3/4" OPEN GRADED BASE)

SIEVE SIZE	PERCENT OF PARTICLES SMALLER THAN SIEVE SIZE
1.5" in.	100
1" in.	95-100
0.5" in.	25-60
No. 4 (0.187 in.)	0-10
No. 8 (0.093 in.)	0-5

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

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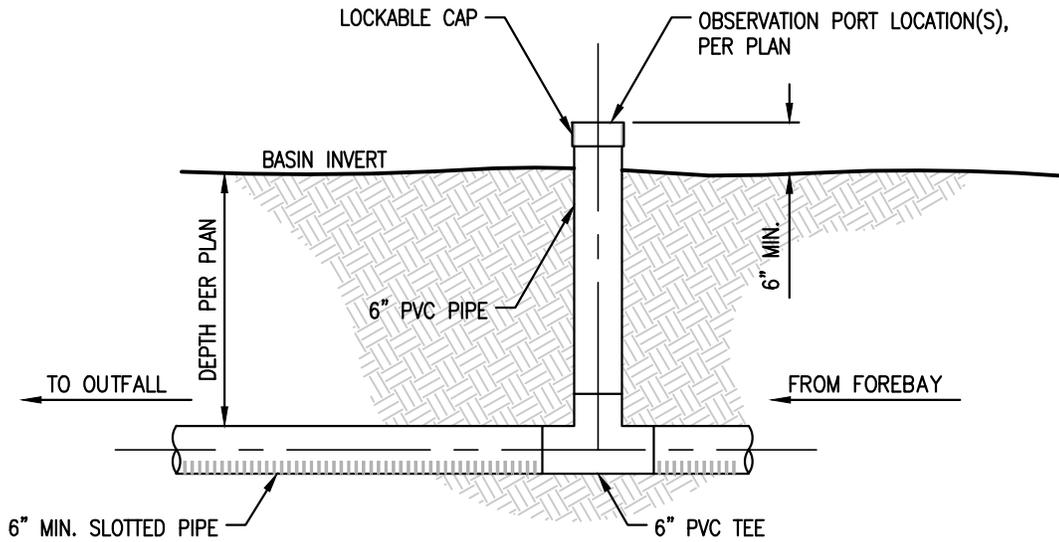
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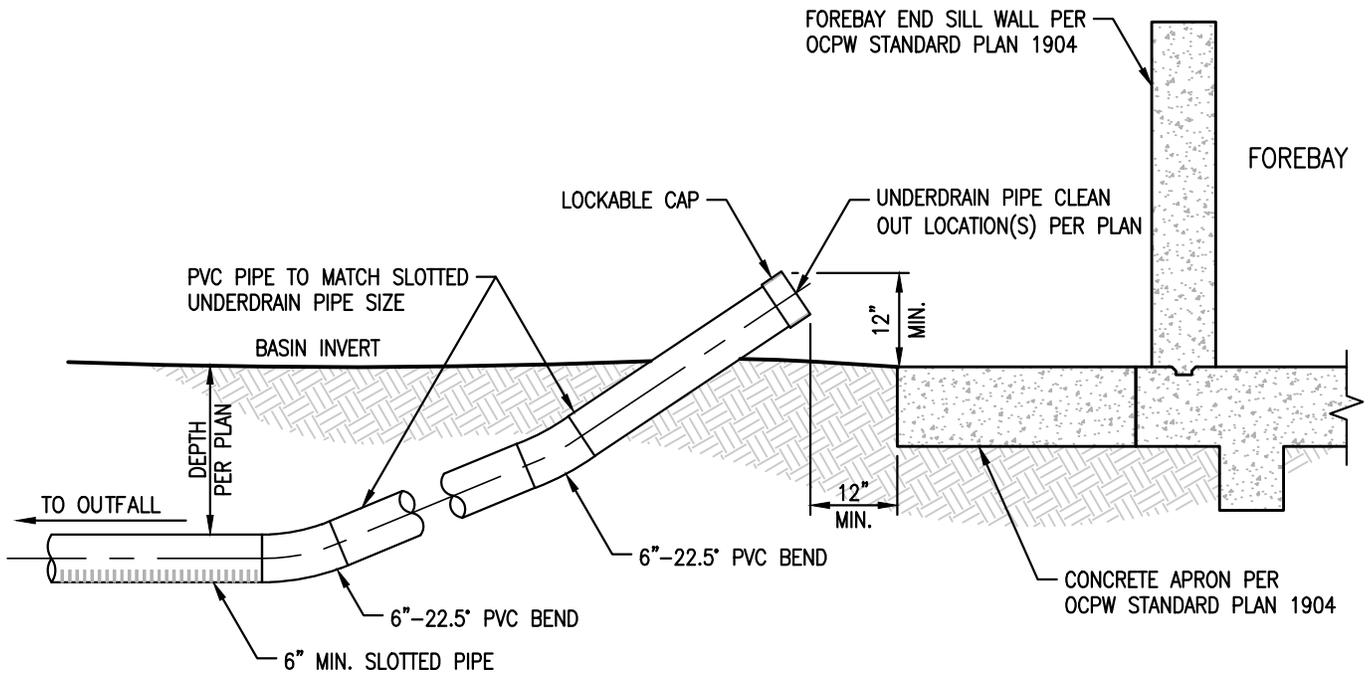
BIOINFILTRATION BASIN FILTER COURSE, STORAGE LAYER, & UNDERDRAIN

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**OBSERVATION PORT
DETAIL - B**

SCALE: 1/2" = 1'-0"



**UNDERDRAIN PIPE CLEANOUT
DETAIL - A**

SCALE: 1/2" = 1'-0"

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

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Kevin Onuma, County Engineer

May 2021

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BIOINFILTRATION BASIN FILTER COURSE, STORAGE LAYER, & UNDERDRAIN

SHT. 3 OF 3

NOTES:

BIORETENTION SOIL MEDIA SPECIFICATIONS

ANY BIOINFILTRATION/BIORETENTION FACILITIES BEING INSTALLED IN THE COUNTY OF ORANGE SHALL MEET THE FOLLOWING BIORETENTION SOIL MEDIA (BSM) CRITERIA.

1. GENERAL CRITERIA AND COMPOSITION

- 1.1. BIORETENTION SOIL MEDIA (BSM) SHOULD CONSIST OF 70 TO 80% FINE SAND AND 20 TO 30% STABLE, WELL-AGED COMPOST BY VOLUME, EACH MEETING THE QUALITY STANDARDS DESCRIBED IN THE FOLLOWING SECTIONS. ALTERNATIVE MIX DESIGNS MAY BE DEVELOPED AND TESTED TO DEMONSTRATE SUITABILITY. DEVIATIONS FROM THESE RANGES AND MATERIAL TYPES MAY ALSO BE NEEDED TO ACHIEVE LOW NUTRIENT LEACHING DESIGNS, WHERE NECESSARY. [NOTE: THE UNIT WEIGHT OF COMPOST IS TYPICALLY LESS THAN HALF OF THE UNIT WEIGHT OF SAND. THEREFORE, THE PERCENTAGE BY MASS IS DIFFERENT].
- 1.2. BSM SHOULD BE DESIGNED TO ACHIEVE THE LONG-TERM HYDRAULIC DESIGN REQUIREMENTS ASSOCIATED WITH THE DESIGN OF THE FACILITY (I.E., DESIGN INFILTRATION RATE).
 - 1.2.1. FOR BIOFILTRATION SYSTEMS WITH UNDERDRAINS, THE HYDRAULIC CONDUCTIVITY SHOULD BE EVALUATED VIA TESTING AND CONFORM TO AN ACCEPTABLE RANGE DUE TO THE IMPORTANCE OF THIS VALUE IN SIZING AND PERFORMANCE OF SYSTEMS. SELECTION OF AN APPROPRIATE INFILTRATION RATE AND EVALUATION OF MIX ACCEPTABILITY IS DESCRIBED IN "INFILTRATION RATE EVALUATION" SECTION OF THIS SPECIFICATION.

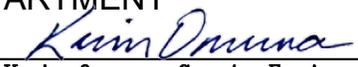
2. SAND SPECIFICATIONS FOR BIORETENTION SOIL MEDIA

- 2.1. SAND SHOULD BE FREE OF WOOD, WASTE, COATING SUCH AS CLAY, STONE DUST, CARBONATE, ETC., OR ANY OTHER DELETERIOUS MATERIAL.
- 2.2. SAND SHOULD BE WASHED.
- 2.3. ALL AGGREGATE PASSING THE NO. 200 SIEVE SIZE SHOULD BE NON-PLASTIC.
- 2.4. SAND FOR BIORETENTION SHOULD BE ANALYZED BY AN ACCREDITED LAB USING #200, #100, #40, #30, #16, #8, #4, AND 3/8" SIEVES (ASTM D 422 OR AS APPROVED BY THE LOCAL PERMITTING AUTHORITY) AND MEET THE FOLLOWING GRADATION (NOTE: ALL SANDS COMPLYING WITH ASTM C33 FOR FINE AGGREGATE CONCRETE SAND COMPLY WITH THE GRADATION REQUIREMENTS BELOW):

SIEVE SIZE (ASTM D422)	SIEVE SIZE (mm)	% PASSING (BY WEIGHT)	
		MINIMUM	MAXIMUM
3/8" in.	9	100	100
#4	4.8	90	100
#8	2.4	70	100
#16	1.2	40	95
#30	0.60	15	70
#40	0.42	5	55
#100	0.15	0	15
#200	0.075	0	5

- 2.5. COEFFICIENT OF UNIFORMITY (CU = D60/D10) SHOULD BE EQUAL TO OR EQUAL TO OR GREATER THAN 4
- 2.6. NOTE: THE GRADATION OF THE SAND COMPONENT OF THE MEDIA AN IMPORTANT MAJOR FACTOR IN THE INFILTRATION RATE OF THE MEDIA MIX. IF THE DESIRED INFILTRATION RATE OF THE MEDIA CANNOT BE ACHIEVED WITHIN THE SPECIFIED PROPORTIONS OF SAND AND COMPOST), THEN IT MAY BE NECESSARY TO UTILIZE SAND AT THE COARSER END OF THE RANGE SPECIFIED IN THE TABLE ABOVE (MINIMUM COLUMN) WITH MORE UNIFORM PARTICLE SIZE (I.E., POORLY GRADED). SAND PRODUCTS SUCH AS "FILTER SAND" AND TOP DRESSING SAND TEND TO MEET THE C33 SPECIFICATION AND SUPPORT HIGHER INFILTRATION RATES.

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BIOINFILTRATION BASIN - BIORETENTION SOIL MEDIA

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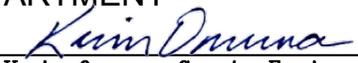
NOTES: (CONT.)

3. COMPOST SOIL SPECIFICATIONS FOR BIORETENTION SOIL MEDIA

- 3.1. COMPOST SHOULD BE A WELL DECOMPOSED, STABLE, WEED FREE ORGANIC MATTER SOURCE DERIVED FROM WASTE MATERIALS INCLUDING YARD DEBRIS, WOOD WASTES, OR OTHER ORGANIC MATERIALS NOT INCLUDING MANURE OR BIOSOLIDS MEETING STANDARDS DEVELOPED BY THE US COMPOSTING COUNCIL (USCC). THE PRODUCT SHALL BE CERTIFIED THROUGH THE USCC SEAL OF TESTING ASSURANCE (STA) PROGRAM (A COMPOST TESTING AND INFORMATION DISCLOSURE PROGRAM). IT IS EXPECTED THAT ONLY SELECT COMPOST PRODUCTS WILL MEET THIS SPECIFICATION. COMPOST QUALITY SHOULD BE VERIFIED VIA A LAB ANALYSIS TO BE:
- 3.1.1. FEEDSTOCK MATERIALS SHALL BE SPECIFIED AND INCLUDE ONE OR MORE OF THE FOLLOWING: LANDSCAPE/YARD TRIMMINGS, GRASS CLIPPINGS, FOOD SCRAPS, AND AGRICULTURAL CROP RESIDUES.
 - 3.1.2. ORGANIC MATTER: 35–75% DRY WEIGHT BASIS.
 - 3.1.3. CARBON AND NITROGEN RATIO: 15:1 < C:N < 40:1; PREFERABLY ABOVE 20:1 TO REDUCE THE POTENTIAL FOR NITROGEN LEACHING/WASHOUT.
 - 3.1.4. NITROGEN BETWEEN 0.6 AND 3% BY DRY WEIGHT.
 - 3.1.5. PHYSICAL CONTAMINANTS (MANMADE INERT MATERIALS) NOT EXCEEDING 1% BY DRY WEIGHT.
 - 3.1.6. MATURITY/STABILITY (QUALITATIVE): COMPOST SHALL HAVE DARK BROWN COLOR AND A SOIL–LIKE ODOR. COMPOST EXHIBITING A SOUR OR PUTRID SMELL, CONTAINING RECOGNIZABLE GRASS OR LEAVES, OR IS HOT (120 F) UPON DELIVERY OR REWETTING IS NOT ACCEPTABLE.
 - 3.1.7. MATURITY (SEED EMERGENCE AND SEEDLING VIGOR): GREATER THAN 80% RELATIVE TO POSITIVE CONTROL (METHOD TMECC 5.05–A, USDA AND U.S. COMPOSTING COUNCIL)
 - 3.1.8. STABILITY (CARBON DIOXIDE EVOLUTION RATE): LESS THAN 2.5 MG CO₂–C PER G COMPOST ORGANIC MATTER (OM) PER DAY OR LESS THAN 5 MG CO₂–C PER G COMPOST CARBON PER DAY, WHICHEVER UNIT IS REPORTED. (METHOD TMECC 5.08–B, USDA AND U.S. COMPOSTING COUNCIL). ALTERNATIVELY A SOLVITA RATING OF 6 OR HIGHER IS ACCEPTABLE.
 - 3.1.9. TOXICITY: ANY ONE OF THE FOLLOWING MEASURES IS SUFFICIENT TO INDICATE NON–TOXICITY:
 - NH₄:NH₃ < 3
 - AMMONIUM < 500 PPM, DRY WEIGHT BASIS
 - SEED GERMINATION > 80% OF CONTROL
 - PLANT TRIALS > 80% OF CONTROL
 - TOTAL BORON SHOULD BE <80 PPM, SOLUBLE BORON < 2.5 PPM
 - 3.1.10. SALINITY: < 6.0 MMHOS/CM OR SOLUBLE SALT CONCENTRATION LESS THAN 10 DS/M (METHOD TMECC 4.10– A, USDA AND U.S. COMPOSTING COUNCIL).
 - 3.1.11. PH BETWEEN 6.5 AND 7.5 (MAY VARY WITH PLANT PALETTE)
 - 3.1.12. COMPOST FOR BIORETENTION SHOULD BE ANALYZED BY AN ACCREDITED LAB USING #200, ¼ INCH, ½ INCH, AND 1 INCH SIEVES (ASTM D 422 OR AS APPROVED BY THE LOCAL PERMITTING AUTHORITY) AND MEET THE FOLLOWING GRADATION:

SIEVE SIZE (ASTM D422)	% PASSING (BY WEIGHT)	
	MINIMUM	MAXIMUM
1" in.	99	100
1/2" in.	90	100
1/4" in.	40	90
#200	0	10

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

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BIOINFILTRATION BASIN - BIORETENTION SOIL MEDIA

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NOTES: (CONT.)

- 3.1.13. TESTS SHOULD BE SUFFICIENTLY RECENT TO REPRESENT THE ACTUAL MATERIAL THAT IS ANTICIPATED TO BE DELIVERED TO THE SITE. IF PROCESSES OR SOURCES USED BY THE SUPPLIER HAVE CHANGED SIGNIFICANTLY SINCE THE MOST RECENT TESTING, NEW TESTS SHOULD BE REQUESTED. COMPOST QUALITY CAN VARY SIGNIFICANTLY BY SEASON AND BY BATCH.
- 3.1.14. NOTE: THE GRADATION OF COMPOST USED IN BIORETENTION MEDIA CAN HAVE AN IMPORTANT INFLUENCE ON THE SATURATED HYDRAULIC CONDUCTIVITY OF THE MEDIA. TO ACHIEVE A HIGHER SATURATED HYDRAULIC CONDUCTIVITY, IT MAY BE NECESSARY TO UTILIZE COMPOST AT THE COARSER END OF THIS RANGE ("MINIMUM" COLUMN). THE PERCENT PASSING THE #200 SIEVE (FINES) IS BELIEVED TO BE THE MOST IMPORTANT FACTOR IN HYDRAULIC CONDUCTIVITY. IN ADDITION, A COARSER COMPOST MIX PROVIDES MORE HETEROGENEITY OF THE BIORETENTION MEDIA, WHICH IS BELIEVED TO BE ADVANTAGEOUS FOR MORE RAPID DEVELOPMENT OF SOIL STRUCTURE NEEDED TO SUPPORT HEALTH BIOLOGICAL PROCESSES. THIS MAY BE AN ADVANTAGE FOR PLANT ESTABLISHMENT WITH LOWER NUTRIENT AND WATER INPUT.

4. MULCH FOR BIORETENTION SOIL MEDIA

- 4.1. THE BIORETENTION PLANTING AREA THAT IS UTILIZING A HAND PLANTING OR PLUG PLANTING REGIME, SHOULD GENERALLY BE COVERED WITH 2 TO 4 INCHES (AVERAGE 3 INCHES) OF WELL-AGED, DOUBLE OR TRIPLE SHREDDED MULCH AT THE TIME OF CONSTRUCTION AND AN ADDITIONAL PLACEMENT OF 1 TO 2 INCHES OF MULCH SHOULD BE ADDED ANNUALLY. MULCH SHOULD BE STOCKPILED AND STORED AT LEAST 12 MONTHS PRIOR TO APPLICATION TO THE BMP AND MUST BE NON-FLOATING TO AVOID CLOGGING OF OVERFLOW STRUCTURES. THE INTENTION IS TO HELP SUSTAIN THE NUTRIENT LEVELS, SUPPRESS WEEDS, RETAIN MOISTURE, AND MAINTAIN INFILTRATION CAPACITY.
- 4.2. INORGANIC MULCH SUCH AS ROCK, MAY BE USED.
- 4.3. WHEN VEGETATION IS ACHIEVED THROUGH SEED OR HYDROSEED, HARDWOOD MULCH IS NOT REQUIRED.

5. BASIC WHOLE MIX TESTING RECOMMENDATIONS

- 5.1. BASIC WHOLE MIX TESTING SHOULD BE DONE FOR ANY APPLICATION OF BSM IN STORMWATER BMPS. THE BLENDED BSM SHOULD BE SUBMITTED TO AN AGRONOMIC LABORATORY FOR A STANDARD "AGRONOMIC SOIL SUITABILITY TEST" WITH TEXTURE CLASS AND ORGANIC MATTER ANALYSES INCLUDED.
- 5.2. ORGANIC MATTER: BETWEEN 2 AND 5 PERCENT BY DRY WEIGHT [NOTE: THIS RANGE IS NOT INCOMPATIBLE WITH THE ORGANIC CONTENT REQUIREMENTS OF COMPOST. IF COMPOST IS 20 PERCENT OF THE MIX BY VOLUME, THIS REPRESENTS ABOUT 7.5 PERCENT OF THE MIX BY DRY WEIGHT. IF COMPOST HAS AN ORGANIC FRACTION OF 35 PERCENT TO 75 PERCENT BY DRY WEIGHT, THEN THE TOTAL MIX ORGANIC CONTENT WOULD BE 2.5 TO 5.5 PERCENT]
- 5.3. TOTAL NITROGEN: 0.1 TO 0.25% BY DRY WEIGHT (100 TO 250 MG/KG) [NOTE: SIMILAR TO THE EXPLANATION ABOVE, THIS IS NOT INCOMPATIBLE WITH THE COMPOST NITROGEN REQUIREMENTS]
- 5.4. PLANT AVAILABLE PHOSPHORUS (ALSO KNOWN AS "P INDEX") (BASED ON WEAK ACID EXTRACTION: AMMONIUM BICARBONATE/DTPA SOIL ANALYSIS OR SIMILAR): 10 TO 50 MG/KG (P INDEX 10 TO 50)
- 5.5. PERCENT SAND/SILT/CLAY: LESS THAN 2 PERCENT CLAY; 5 TO 20 PERCENT SILT OR INFILTRATION TESTING SHOWING GREATER THAN 10 INCHES PER HOUR
- 5.6. PH RANGE: 6.0-7.5
- 5.7. SALINITY LESS THAN 3.0 MILLIMHO/CM (AS MEASURED BY ELECTRICAL CONDUCTIVITY)

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved


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BIOINFILTRATION BASIN - BIORETENTION SOIL MEDIA

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NOTES: (CONT.)

- 5.8. SODIUM ADSORPTION RATION (SAR) LESS THAN 3.0
- 5.9. CHLORIDE LESS THAN 150 PPM
- 5.10. AN ASSESSMENT OF AGRICULTURAL SUITABILITY FOR HEARTY, WELL-SUITED PLANTS BASED ON TEST RESULTS SHOULD BE CONDUCTED, INCLUDING RECOMMENDATIONS FOR ADDING AMENDMENTS, CHEMICAL CORRECTIONS, OR BOTH.

5.11. TESTING REPORTS SHOULD INCLUDE:

DATE OF TESTING

PROJECT NAME

THE CONTRACTOR'S NAME

SOURCE OF MATERIALS AND SUPPLIER'S NAME

ADEQUATE INFORMATION TO DEMONSTRATION CONFORMANCE WITH THE CRITERIA ABOVE.

- 5.12. RATIONALE: A BSM THAT ADHERES TO THE GENERAL GUIDELINES FOR MIX COMPOSITION, SAND PROPERTIES, AND COMPOST PROPERTIES SHOULD PROVIDE ACCEPTABLE PROPERTIES FOR MOST APPLICATIONS. HOWEVER, DUE TO RANGES OF PHYSICAL AND CHEMICAL PROPERTIES THAT EXIST IN SAND AND COMPOST SPECIFICATIONS AND VARIABILITY IN SUPPLY STOCKS, BASIC TESTING OF THE SPECIFIC WHOLE BSM PROPOSED FOR THE PROJECT IS STRONGLY RECOMMENDED. THE RANGES OF CRITERIA ARE INTENDED TO AVOID MIXES THAT HAVE CLEAR MATERIAL QUALITY ISSUES.

6. INFILTRATION RATE EVALUATION

- 6.1. THIS SECTION APPLIES BIOFILTRATION BASINS WITH UNDERDRAINS WHERE A SPECIFIC RANGE OF MEDIA INFILTRATION RATES IS ESTABLISHED IN DESIGN AND IS CRITICAL FOR SIZING.

- 6.2. THE SATURATED HYDRAULIC CONDUCTIVITY OR INFILTRATION RATE OF THE WHOLE BSM SHALL BE MEASURED BY ONE OF THE FOLLOWING METHODS:

- MEASUREMENT OF HYDRAULIC CONDUCTIVITY (USDA HANDBOOK 60, METHOD 34B) (COMMONLY AVAILABLE AS PART OF STANDARD AGRONOMIC SOIL EVALUATION @ ESTIMATED \$30 TO 50 PER SAMPLE), OR

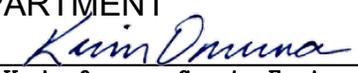
- ASTM D2434 PERMEABILITY OF GRANULAR SOILS (AT APPROXIMATELY 85 PERCENT RELATIVE COMPACTION STANDARD PROCTOR, ASTM D698)

- 6.3. BSM SHOULD CONFORM TO HYDRAULIC CRITERIA ASSOCIATED WITH THE BMP DESIGN CONFIGURATION THAT BEST APPLIES TO THE FACILITY WHERE THE BSM WILL BE INSTALLED (OPTIONS DESCRIBE BELOW).

- 6.3.1. SYSTEMS WITH HYDRAULIC CONTROL ON THE OUTLET OF THE UNDERDRAIN SYSTEM (I.E., OUTLET CONTROL): FOR SYSTEMS IN WHICH THE FLOWRATE OF WATER THROUGH THE MEDIA IS CONTROLLED VIA AN OUTLET CONTROL DEVICE (E.G., ORIFICE OR VALVE) AFFIXED TO THE OUTLET OF THE UNDERDRAIN SYSTEM, THE INFILTRATION RATE OR HYDRAULIC CONDUCTIVITY OF THE MEDIA SHOULD BE AT LEAST 20 INCHES PER HOUR AND NOT MORE THAN 40 INCHES PER HOUR. THE OUTLET CONTROL DEVICE SHOULD CONTROL THE FLOWRATE TO BETWEEN 5 AND 12 INCHES PER HOUR. THIS CONFIGURATION REDUCES THE SENSITIVITY OF SYSTEM PERFORMANCE TO THE PERMEABILITY OF THE MATERIAL, REDUCES THE LIKELIHOOD OF SHORT CIRCUITING THROUGH MEDIA, AND ALLOWS MORE PRECISE DESIGN AND CONTROL OF SYSTEM FLOW RATES. FOR THESE REASONS, OUTLET CONTROL SHOULD BE CONSIDERED THE PREFERRED DESIGN OPTION.

- 6.3.2. SYSTEMS WITH FREE-FLOWING UNDERDRAIN SYSTEM: (I.E., FLOWRATE IS CONTROLLED BY THE PERMEABILITY OF THE BSM): FOR SYSTEMS WITH UNDERDRAINS THAT ARE NOT RESTRICTED, THE BSM SHOULD HAVE MINIMUM MEASURED HYDRAULIC CONDUCTIVITY OF 8 INCHES PER HOUR TO ENSURE ADEQUATE FLOW RATE THROUGH THE BMP AND LONGEVITY OF THE SYSTEM. THIS RESULTS IN A RECOMMENDED DESIGN INFILTRATION RATE OF 2 TO 4 INCHES PER HOUR TO ACCOUNT FOR POTENTIAL COMPACTION AND CLOGGING. THE BSM SHOULD HAVE A MAXIMUM MEASURED HYDRAULIC CONDUCTIVITY OF NO MORE THAN 20 INCHES PER HOUR TO PROVIDE ADEQUATE CONTACT TIME AND TREATMENT. WHERE THIS LIMIT CANNOT BE ACHIEVED, AN OUTLET CONTROLLED CONFIGURATION SHOULD BE CONSIDERED. IN ALL CASES, AN UPTURNED ELBOW SYSTEM ON THE UNDERDRAIN, MEASURING 6 TO 12 INCHES ABOVE THE INVERT OF THE UNDERDRAIN, SHOULD BE USED TO CONTROL VELOCITIES IN THE UNDERDRAIN PIPE AND REDUCE POTENTIAL FOR SOLID MIGRATION THROUGH THE SYSTEM.

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6.4. RATIONALE: THE MEDIA INFILTRATION RATE IS A CRITICAL PARAMETER IN SIZING AND DESIGN OF BIOFILTRATION BASINS WITH UNDERDRAINS. IT IS NECESSARY TO CONFIRM THAT THE INFILTRATION RATE IS REASONABLY CONSISTENT WITH WHAT HAS BEEN USED IN SIZING AND DESIGN AND IS CAPABLE OF PROVIDING ADEQUATE TREATMENT. INFILTRATION RATES THAT ARE TOO SLOW MAY NOT PROVIDE LONG TERM CAPTURE PERFORMANCE ADEQUATE TO MEET SIZING CRITERIA. INFILTRATION RATES THAT ARE TOO HIGH MAY NOT PROVIDE ADEQUATE TREATMENT OR CAN BE SUSCEPTIBLE TO SHORT-CIRCUITING UNLESS USED IN AN OUTLET CONTROLLED CONFIGURATION.

7. CHEMICAL SUITABILITY EVALUATION

7.1. THIS SECTION APPLIES TO BIOFILTRATION BASINS WITH UNDERDRAINS. IN THESE SYSTEMS, IT IS MORE CRITICAL TO ENSURE THAT SIGNIFICANT INCREASES IN POLLUTANTS WILL NOT OCCUR AS A RESULT OF FILTRATION OF WATER THROUGH THE MEDIA (I.E., POLLUTANT LEACHING). NUTRIENTS ARE THE MOST COMMON FORM OF LEACHED POLLUTANTS. HOWEVER, METALS HAVE ALSO BEEN OBSERVED.

7.2. THE BASIC TESTING DESCRIBED ABOVE IS ADEQUATE WHERE NUTRIENTS OR METALS ARE NOT IDENTIFIED AS IMPAIRMENTS OR TMDLS.

7.3. WHERE NUTRIENTS OR METALS ARE IDENTIFIED AS IMPAIRMENTS OR TMDLS IN ANY RECEIVING WATER, THE STANDARD "AGRONOMIC SOIL SUITABILITY TEST" SHOULD BE AUGMENTED WITH SATURATED MEDIA EXTRACT METHOD (AKA "SATURATION EXTRACT") TESTING THAT COVERS AT LEAST THE FOLLOWING PARAMETERS.

- NITRATE AS N: < 3 MG/L

- PLANT AVAILABLE PHOSPHORUS (P INDEX): 10 TO 30 MG/KG (THIS IS A TIGHTER RANGE THAN SPECIFIED FOR BASIC EVALUATION ABOVE)

- ZINC < 0.1 MG/L (100 PPB)

- COPPER < 0.025 MG/L (25 PPB)

- LEAD < 0.025 MG/L

- ARSENIC < 0.02 MG/L

- CADMIUM < 0.01 MG/L

- MERCURY < 0.01 MG/L

- SELENIUM < 0.01 MG/L

7.4. THE SYNTHETIC PRECIPITATION LEACHING PROCEDURE (SPLP) (EPA SW-846, METHOD 1312) MAY ALSO BE USED.

7.5. CRITERIA SHOULD BE MET AS STATED WHERE A POLLUTANT IS ASSOCIATED WITH A WATER QUALITY IMPAIRMENT OR TOTAL MAXIMUM DAILY LOAD (TMDL) IN ANY DOWNSTREAM RECEIVING WATER. CRITERIA MAY BE WAIVED OR MODIFIED, AT THE DISCRETION OF THE REVIEWER, WHERE A POLLUTANT DOES NOT HAVE A NEXUS TO A WATER QUALITY IMPAIRMENT OR TMDL OF DOWNSTREAM RECEIVING WATER(S).

7.6. NOTE THAT SATURATION EXTRACT AND SPLP TESTS ARE EXPECTED TO RESULT IN SOMEWHAT MORE LEACHING THAN WOULD BE EXPERIENCED WITH REAL STORMWATER; THEREFORE A DIRECT COMPARISON TO WATER QUALITY STANDARDS OR EFFLUENT LIMITATIONS IS NOT APPROPRIATE.

8. ALTERNATIVE MIX COMPONENTS AND PROPORTIONS

8.1 ALTERNATIVE MIX COMPONENTS AND PROPORTIONS MAY BE UTILIZED, PROVIDED THAT THE WHOLE BLENDED MIX CONFORMS TO THE CRITERIA IDENTIFIED IN THE BASIC WHOLE MIX TESTING, INFILTRATION RATE EVALUATION, AND CHEMICAL SUITABILITY EVALUATION, AS APPLICABLE. ALTERNATIVE MIX DESIGNS MAY INCLUDE ALTERNATIVE PROPORTIONS, ALTERNATIVE ORGANIC AMENDMENTS (E.G., PEAT, COCO COIR PITH) AND/OR USE OF NATURAL SOILS. ALTERNATIVE MIXES ARE SUBJECT TO APPROVAL BY THE REVIEWER. ALTERNATIVE MIXTURES MAY BE PARTICULARLY APPLICABLE FOR SYSTEMS WITH UNDERDRAINS IN AREAS WHERE PHOSPHORUS IS ASSOCIATED WITH A WATER QUALITY IMPAIRMENT OR A TOTAL MAXIMUM DAILY LOAD (TMDL) IN A DOWNSTREAM RECEIVING WATER.

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9. CONSTRUCTION GUIDELINES

- 9.1. THE CONTRACTOR SHOULD NOT DELIVER OR PLACE SOILS IN WET OR MUDDY CONDITIONS. THE CONTRACTOR SHOULD PROTECT SOILS AND MIXES FROM ABSORBING EXCESS WATER AND FROM EROSION AT ALL TIMES. THE CONTRACTOR SHOULD NOT STORE MATERIALS UNPROTECTED FROM RAINFALL EVENTS (>0.25 INCHES). IF WATER IS INTRODUCED INTO THE MATERIAL WHILE IT IS STOCKPILED, THE CONTRACTOR SHOULD ALLOW MATERIAL TO DRAIN PRIOR TO PLACEMENT
- 9.2. BSM SHOULD BE THOROUGHLY MIXED PRIOR TO DELIVERY USING MECHANICAL MIXING METHODS SUCH AS A DRUM MIXER.
- 9.3. BSM SHOULD BE LIGHTLY COMPACTED AND PLACED IN LOOSE LIFTS APPROXIMATELY 12 INCHES (300 MM) TO ENSURE REASONABLE SETTLEMENT WITHOUT EXCESSIVE COMPACTION, SUCH AS VIA A ROLLING LANDSCAPING COMPACTION DRUM (HAND OPERATED). COMPACTION WITHIN THE BSM AREA SHOULD NOT EXCEED 75 TO 85% STANDARD PROCTOR WITHIN THE DESIGNED DEPTH OF THE BSM. MACHINERY SHOULD NOT BE USED IN THE BIORETENTION FACILITY TO PLACE THE BSM. A CONVEYOR OR SPRAY SYSTEM SHOULD BE USED FOR MEDIA PLACEMENT IN LARGE FACILITIES. LOW GROUND PRESSURE EQUIPMENT MAY BE AUTHORIZED FOR LARGE FACILITIES AT THE DISCRETION OF THE REVIEWER.
- 9.4. PLACEMENT METHODS AND BSM QUANTITIES SHOULD ACCOUNT FOR APPROXIMATELY 10 PERCENT REDUCTION IN MEDIA VOLUME DUE TO SETTLING. PLANTING METHODS AND TIMING SHOULD ACCOUNT FOR SETTLING OF MEDIA WITHOUT EXPOSING PLANT ROOT SYSTEMS.
- 9.5. THE PERMITTEE CONSTRUCTION INSPECTOR MAY REQUEST UP TO THREE DOUBLE RING INFILTRMETER TESTS (ASTM D3385) OR APPROVED ALTERNATE TESTS TO CONFIRM THAT THE PLACED MATERIAL MEETS APPLICABLE INFILTRATION RATE RANGE. IN THE EVENT THAT THE INFILTRATION RATE OF PLACED MATERIAL DOES NOT MEET APPLICABLE CRITERIA, THE PERMITTEE MAY REQUIRE REPLACEMENT AND/OR DECOMPACTION OF MATERIALS.
- 9.6. CLOSE ADHERENCE TO THE MATERIAL QUALITY CONTROLS HEREIN ARE NECESSARY IN ORDER TO ASSURE SUFFICIENT PERMEABILITY TO INFILTRATE/FILTER RUNOFF DURING THE LIFE OF THE FACILITY, SUPPORT HEALTHY VEGETATION, AND MINIMIZE POLLUTANT LEACHING.
- 9.7. ACCEPTANCE OF THE MATERIAL SHOULD BE BASED ON TEST RESULTS CONDUCTED NO MORE THAN 120 DAYS PRIOR TO DELIVERY OF THE BLENDED BSM TO THE PROJECT SITE AND CERTIFIED TO BE REPRESENTATIVE OF THE MIX COMPOSITION THAT IS ACTUALLY USED. FOR PROJECTS INSTALLING MORE THAN 100 CUBIC YARDS OF BSM, BATCH-SPECIFIC TESTS OF THE BLENDED MIX SHOULD BE PROVIDED TO THE PERMITTEE INSPECTOR FOR EVERY 100 CUBIC YARDS OF BSM ALONG WITH A SITE PLAN SHOWING THE PLACEMENT LOCATIONS OF EACH BSM BATCH WITHIN THE FACILITY.

10. NARRATIVE GUIDANCE FOR BALANCING PLANT GROWTH WITH NUTRIENT LEACHING

- 10.1. WHERE THE BMP DISCHARGES TO RECEIVING WATERS WITH NUTRIENT IMPAIRMENTS OR NUTRIENT TMDLS, THERE IS A BALANCE THAT NEEDS TO BE MAINTAINED BETWEEN PROVIDING ENOUGH NUTRIENTS FOR PLANT GROWTH WHILE AVOIDING CHRONIC LEACHING OF NUTRIENTS FROM THE MEDIA.
 - 10.1.1. IN GENERAL, THE POTENTIAL FOR LEACHING OF NUTRIENTS CAN BE MINIMIZED BY:
 - 10.1.1.1. UTILIZING STABLE, AGED COMPOST (AS REQUIRED OF MEDIA MIXES UNDER ALL CONDITIONS).
 - 10.1.1.2. UTILIZING OTHER SOURCES OF ORGANIC MATTER, AS APPROPRIATE, THAT ARE SAFE, NON-TOXIC, AND HAVE LOWER POTENTIAL FOR NUTRIENT LEACHING THAN COMPOST (E.G., WOOD COMPOST, PEAT, COCO COIR PITH).
 - 10.1.1.3. REDUCING THE CONTENT OF COMPOST OR OTHER ORGANIC MATERIAL IN THE MEDIA MIX TO THE MINIMUM AMOUNT NECESSARY TO SUPPORT PLANT GROWTH AND HEALTHY BIOLOGICAL PROCESSES.
 - 10.1.2. A BOTANIST, AGRONOMIST, AND/OR LANDSCAPE ARCHITECT CAN BE CONSULTED TO ASSIST IN BALANCING THE INTERESTS OF PLANT ESTABLISHMENT, WATER RETENTION CAPACITY (IRRIGATION DEMAND), AND THE POTENTIAL FOR NUTRIENT LEACHING. THE FOLLOWING PRACTICES SHOULD BE CONSIDERED IN DEVELOPING THE MEDIA MIX DESIGN:
 - 10.1.2.1. THE ACTUAL NUTRIENT CONTENT AND ORGANIC CONTENT OF THE SELECTED COMPOST SOURCE SHOULD BE CONSIDERED WHEN SPECIFYING THE PROPORTIONS OF COMPOST AND SAND. THE COMPOST SPECIFICATION ALLOWS A RANGE OF ORGANIC CONTENT OVER APPROXIMATELY A FACTOR OF 2 AND NUTRIENT CONTENT MAY VARY MORE WIDELY. THEREFORE, DETERMINING THE ACTUAL ORGANIC CONTENT AND NUTRIENT CONTENT OF THE COMPOST EXPECTED TO BE SUPPLIED IS IMPORTANT IN DETERMINING THE PROPORTION TO BE USED FOR AMENDMENT.
 - 10.1.2.2. A COMMITMENT TO PERIODIC SOIL TESTING FOR NUTRIENT CONTENT AND A COMMITMENT TO ADAPTIVE MANAGEMENT OF NUTRIENT LEVELS CAN HELP REDUCE THE AMOUNT OF ORGANIC AMENDMENT THAT MUST BE PROVIDED INITIALLY. GENERALLY, NUTRIENTS CAN BE ADDED PLANTING AREAS THROUGH THE ADDITION OF ORGANIC MULCH BUT CANNOT BE REMOVED.

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- 10.1.2.3. PLANT PALETTES AND THE ASSOCIATED PLANTING MIX SHOULD BE DESIGNED WITH NATIVE PLANTS WHERE POSSIBLE. NATIVE PLANTS GENERALLY HAVE A BROADER TOLERANCE FOR NUTRIENT CONTENT, AND CAN BE LONGER LIVED IN LEANER/LOWER NUTRIENT SOILS. AN ADDITIONAL BENEFIT OF LOWER NUTRIENT LEVELS ARE THAT NATIVE PLANTS WILL GENERALLY HAVE LESS COMPETITION FROM WEEDS.
- 10.1.2.4. NUTRIENTS ARE BETTER RETAINED IN SOILS WITH HIGHER CATION EXCHANGE CAPACITY (CEC). CEC CAN BE INCREASED THROUGH SELECTION OF ORGANIC MATERIAL WITH NATURALLY HIGH CEC, SUCH AS PEAT, AND/OR SELECTION OF INORGANIC MATERIAL WITH HIGH CEC SUCH AS SOME SANDS OR ENGINEERED MINERALS (E.G., LOW P-INDEX SANDS, ZEOLITES, RHYOLITES, ETC). INCLUDING HIGHER CEC MATERIALS WOULD TEND TO REDUCE THE NET LEACHING OF NUTRIENTS.
- 10.1.2.5. SOIL STRUCTURE CAN BE MORE IMPORTANT THAN NUTRIENT CONTENT IN PLANT SURVIVAL AND BIOLOGIC HEALTH OF THE SYSTEM. IF A GOOD SOIL STRUCTURE CAN BE CREATED WITH VERY LOW AMOUNTS OF COMPOST, PLANTS SURVIVABILITY SHOULD STILL BE PROVIDED. SOIL STRUCTURE IS LOOSELY DEFINED AS THE ABILITY OF THE SOIL TO CONDUCT AND STORE WATER AND NUTRIENTS AS WELL AS THE DEGREE OF AERATION OF THE SOIL. WHILE SOIL STRUCTURE GENERALLY DEVELOPS WITH TIME, PLANTING/STORAGE MEDIA CAN BE DESIGNED TO PROMOTE EARLIER DEVELOPMENT OF SOIL STRUCTURE. SOIL STRUCTURE IS ENHANCED BY THE USE OF AMENDMENTS WITH HIGH HUMMUS CONTENT (AS FOUND IN WELL-AGED ORGANIC MATERIAL). IN ADDITION, SOIL STRUCTURE CAN BE ENHANCED THROUGH THE USE OF COMPOST/ORGANIC MATERIAL WITH A DISTRIBUTION OF PARTICLE SIZES (I.E., A MORE HETEROGENEOUS MIX).
- 10.1.2.6. YOUNGER PLANTS ARE GENERALLY MORE TOLERANT OF LOWER NUTRIENT LEVELS AND TEND TO HELP DEVELOP SOIL STRUCTURE AS THEY GROW. STARTING PLANTS FROM SMALLER TRANSPLANTS CAN HELP REDUCE THE NEED FOR ORGANIC AMENDMENTS AND IMPROVE SOIL STRUCTURE. THE PROJECT SHOULD BE ABLE TO ACCEPT A PLANT MORTALITY RATE THAT IS SOMEWHAT HIGHER THAN STARTING FROM LARGER PLANTS AND PROVIDING HIGH ORGANIC CONTENT.
- 10.1.3. WITH THESE CONSIDERATIONS, IT IS ANTICIPATED THAT LESS THAN 20 PERCENT COMPOST AMENDMENT COULD BE USED, WHILE STILL BALANCING PLANT SURVIVABILITY AND WATER RETENTION.

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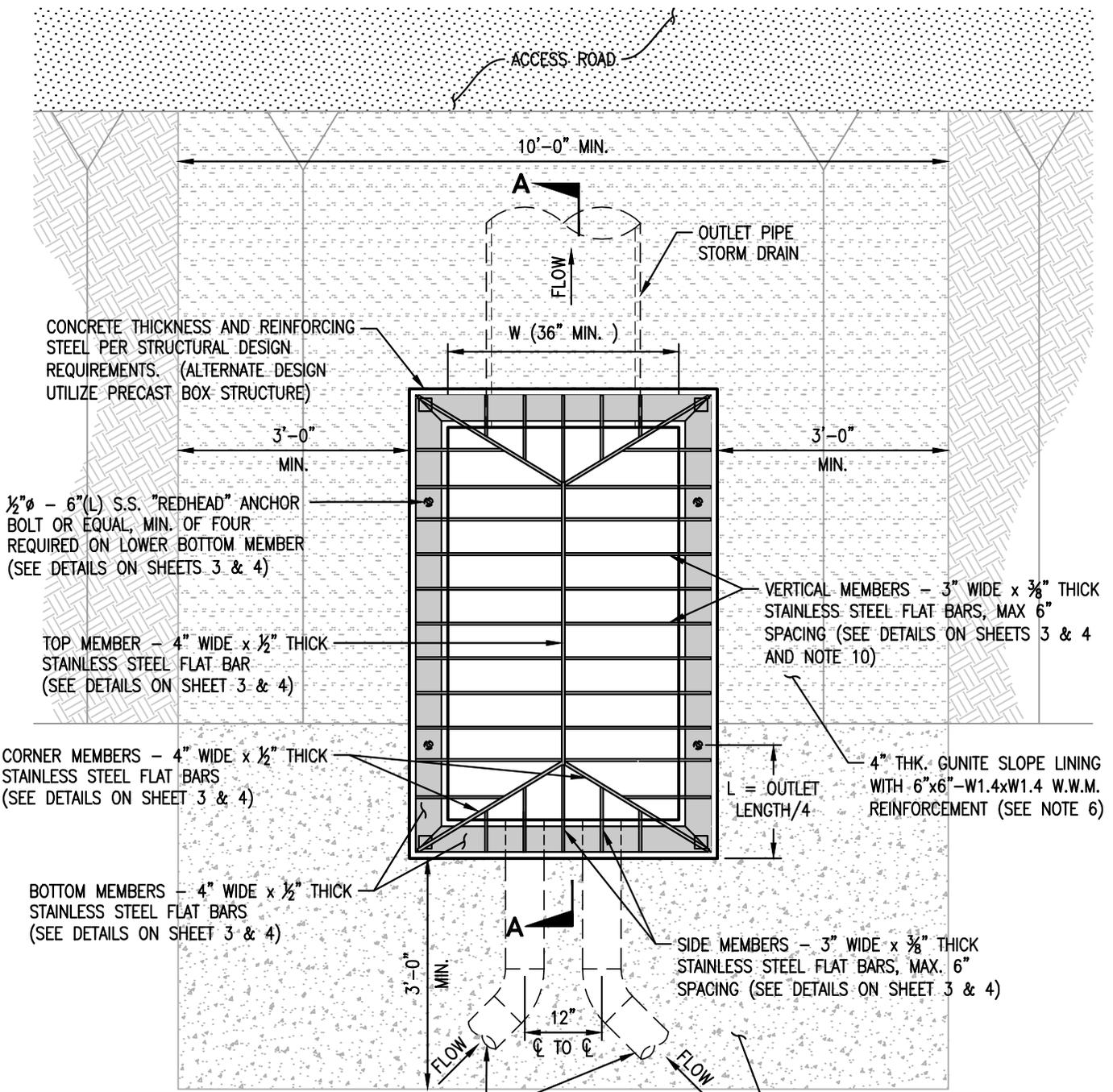
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CONCRETE THICKNESS AND REINFORCING STEEL PER STRUCTURAL DESIGN REQUIREMENTS. (ALTERNATE DESIGN UTILIZE PRECAST BOX STRUCTURE)

$\frac{1}{2}$ " ϕ - 6"(L) S.S. "REDHEAD" ANCHOR BOLT OR EQUAL, MIN. OF FOUR REQUIRED ON LOWER BOTTOM MEMBER (SEE DETAILS ON SHEETS 3 & 4)

TOP MEMBER - 4" WIDE x $\frac{1}{2}$ " THICK STAINLESS STEEL FLAT BAR (SEE DETAILS ON SHEET 3 & 4)

CORNER MEMBERS - 4" WIDE x $\frac{1}{2}$ " THICK STAINLESS STEEL FLAT BARS (SEE DETAILS ON SHEET 3 & 4)

BOTTOM MEMBERS - 4" WIDE x $\frac{1}{2}$ " THICK STAINLESS STEEL FLAT BARS (SEE DETAILS ON SHEET 3 & 4)

VERTICAL MEMBERS - 3" WIDE x $\frac{3}{8}$ " THICK STAINLESS STEEL FLAT BARS, MAX. 6" SPACING (SEE DETAILS ON SHEETS 3 & 4 AND NOTE 10)

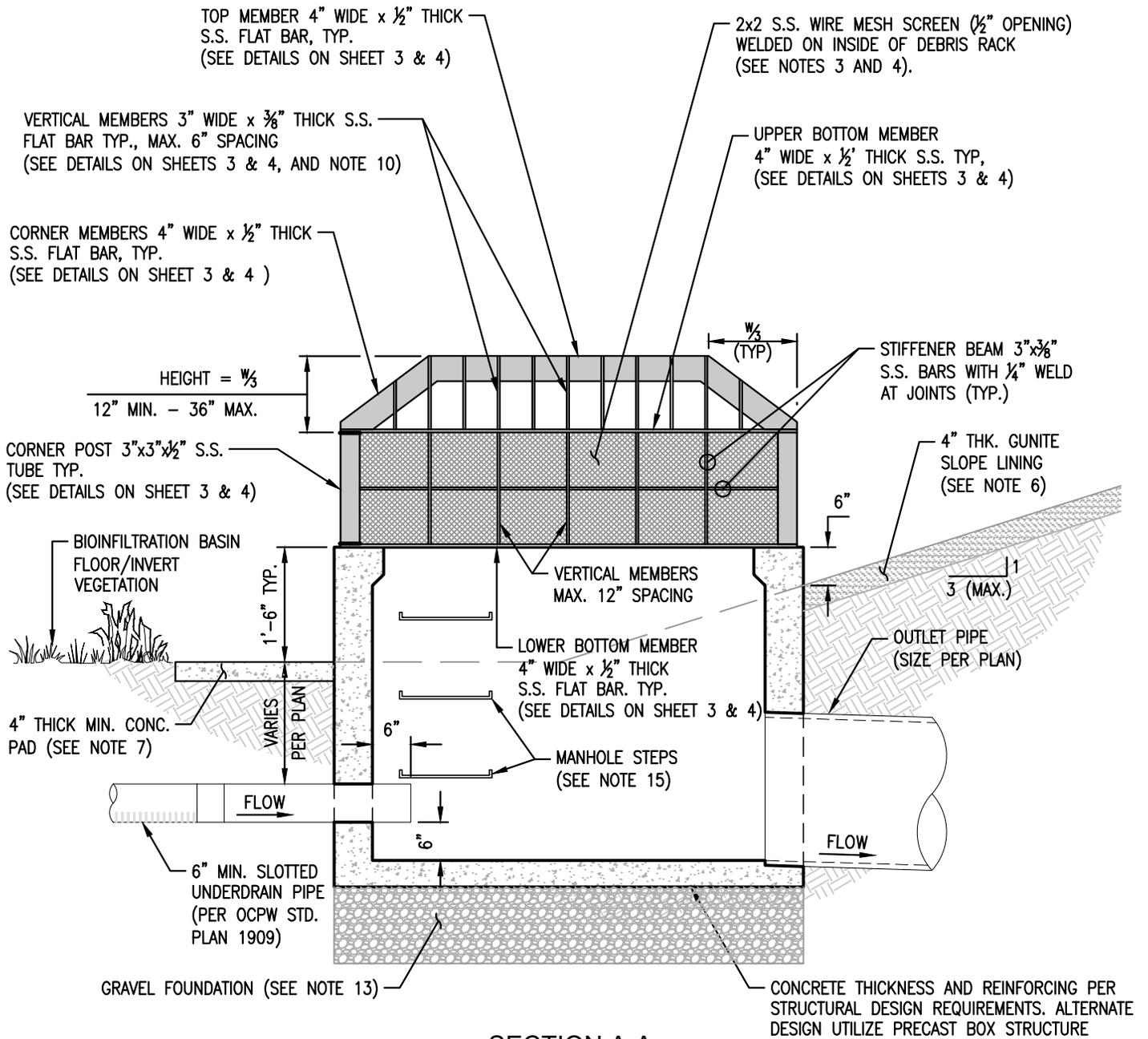
4" THK. GUNITES SLOPE LINING WITH 6"x6"-W1.4xW1.4 W.W.M. REINFORCEMENT (SEE NOTE 9)

SIDE MEMBERS - 3" WIDE x $\frac{3}{8}$ " THICK STAINLESS STEEL FLAT BARS, MAX. 6" SPACING (SEE DETAILS ON SHEET 3 & 4)

4" THICK MIN. CONC. PAD WITH 6"x6"- W1.4xW1.4 W.W.M. REINFORCEMENT (SEE NOTE 7)

6" MIN. SLOTTED UNDERDRAIN PIPE, TYP. (PER OCPW STANDARD PLAN 1909)

PLAN
N.T.S.



SECTION A-A
N.T.S.

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BIOINFILTRATION BASIN OVERFLOW TOWER & UNDERDRAIN

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3" WIDE x 3/8" THICK S.S. VERTICAL MEMBER WITH 1/4" WELD AT BOTTOM MEMBER JOINTS (BOTH SIDES, TYP.)

4" WIDE x 1/2" THICK S.S. BOTTOM MEMBER WITH 3/16" WELD AT JOINTS (TOP AND BOTTOM OF JOINTS TYP., APPLIES TO UPPER AND LOWER BOTTOM MEMBERS)

CORNER POST MEMBER
3"x3"x1/2" S.S. TUBE

CONCRETE OUTLET TOWER WALL

DETAIL - A (TYP.)

N.T.S.

4" WIDE x 1/2" THICK S.S. TOP MEMBER

1/4" WELD AT TOP MEMBER JOINT (BOTH SIDES, TYP.)

3" WIDE x 3/8" THICK S.S. VERTICAL MEMBER

DETAIL - B (TYP.)

N.T.S.

CONCRETE OUTLET TOWER WALL

1/2"φ - 6"(L) S.S. "REDHEAD" ANCHOR BOLT OR EQUAL, PER NOTE 8 (AT LOWER BOTTOM MEMBER ONLY)

4" WIDE x 1/2" THICK S.S. LOWER BOTTOM MEMBER (TYP.)

DETAIL - C (TYP.)

N.T.S.

4" WIDE x 1/2" THICK S.S. BOTTOM MEMBER (TYP.)

S.S. NUT AND WASHER

CONCRETE OUTLET TOWER WALL

1/2"φ - 6"(L) S.S. "REDHEAD" ANCHOR BOLT OR EQUAL, PER NOTE 8

SECTION C-C

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4" WIDE x 1/2" THICK S.S. BOTTOM MEMBER
WITH 3/16" WELD AT JOINTS (TOP AND
BOTTOM OF JOINTS TYP., APPLIES TO
UPPER AND LOWER BOTTOM MEMBERS)

CORNER POST MEMBER
3"x3"x1/2" S.S. TUBE

CONCRETE OUTLET
TOWER WALL

DETAIL - D (TYP.)
N.T.S.

1/4" ALL AROUND WELD AT CORNER POST JOINTS (TYP.)
(AT TOP AND BOTTOM OF CORNER POST)

CORNER POST MEMBER 3"x3"x1/2" S.S. TUBE (TYP.)

1/4" ALL AROUND WELD AT CORNER POST JOINTS (TYP.)
(AT TOP AND BOTTOM OF CORNER POST)

CONCRETE OUTLET TOWER WALL

UPPER
BOTTOM
MEMBER

LOWER
BOTTOM
MEMBER

DETAIL - E (TYP.)
N.T.S.

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BIOINFILTRATION BASIN OVERFLOW TOWER & UNDERDRAIN

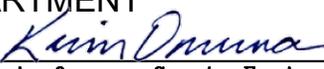
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NOTES:

1. REINFORCED CONCRETE OUTLET TOWER PROVIDES A PERMANENT LOW MAINTENANCE FACILITY TO REGULATE FLOWS LEAVING THE BASIN. THE HEIGHT OF TOWER REFLECTS THE PERMANENT RETENTION POOL DEPTH. THE DEPTH OF THE TOWER BELOW THE BASIN FLOOR EXTENDS TO THE INVERT ELEVATION OF THE OUTLET PIPE. THE CONCRETE TOWER CAN BE CAST-IN-PLACE OR PRECAST CONCRETE.
2. THE CREST OF THE OUTLET TOWER IS DETERMINED BASED ON THE MAXIMUM PONDING DEPTH TO ACCOMMODATE OVERFLOW ONCE THE WATER QUALITY VOLUME (WQV) STORAGE IS EXCEEDED. DIMENSIONS FOR THE LENGTH AND WIDTH OF THE RECTANGULAR OUTLET TOWER ARE BASED ON OVERFLOW HYDRAULICS ASSUMING WEIR FLOW OVER THE OPEN TOP PORTION OF THE TOWER. ADDITIONALLY, THE WIDTH OF THE TOWER MUST BE ABLE TO ACCOMMODATE THE DIAMETER OF THE BASIN OUTFLOW PIPE.
3. VERTICAL GRATE/SCREEN SURROUNDING THE TOP OF THE OUTLET TOWER ABOVE THE MAXIMUM PONDING DEPTH IS TO ACCOMMODATE OVERFLOW ONCE THE WATER QUALITY VOLUME (WQV) STORAGE IS EXCEEDED. THE GRATE IS SIZED TO ACCOMMODATE THE MAXIMUM FLOW DELIVERED AND THE OPENING SIZE OF THE VERTICAL SCREEN IS TO PREVENT FLOATING DEBRIS FROM EXITING THE BASIN. THE 2 X 2 (1/2" OPENING) STAINLESS STEEL MESH SCREEN IS ONLY REQUIRED FOR BASINS WITH MULCH.
4. HEIGHT OF THE VERTICAL GRATE/SCREEN IS BASED UPON WEIR FLOW HYDRAULICS FOR THE TOTAL FLOW DELIVERED TO THE BASIN. DESIGNER SHALL ACCOUNT FOR PERIMETER CONSTRICTED BY THE GRATE.
5. AN INCLINED, REMOVABLE STAINLESS STEEL DEBRIS RACK SIMILAR TO A CONVENTIONAL "BIRDCAGE" RACK IS PROVIDED ON TOP OF THE VERTICAL GRATE/SCREEN AS A SECONDARY OVERFLOW IN CASE THE SCREEN IS CLOGGED WITH DEBRIS.
6. GUNITE (AIR-PLACED CONCRETE) SLOPE LINING SHALL BE CONSTRUCTED WITH A 6-INCH X 6-INCH - W1.4 X W1.4 WELDED WIRE MESH REINFORCEMENT CENTERED WITHIN THE CONCRETE. THE GUNITE SLOPE LINING SHALL HAVE A TRANSVERSE RAKED FINISH, AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH GREENBOOK SPECIFICATIONS SECTION 303-2, METHOD A.
7. CONCRETE PAD SHALL BE CONSTRUCTED WITH A 6-INCH X 6-INCH - W1.4 X W1.4 WELDED WIRE MESH REINFORCEMENT CENTERED WITHIN THE CONCRETE SLAB. THE CONCRETE PAD SHALL HAVE A TRANSVERSE RAKED FINISH, AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH OCPW STANDARD PLAN 1803.
8. A MINIMUM OF FOUR (TWO ON EACH SIDE) "REDHEAD" ANCHOR BOLTS, OR EQUIVALENT, ARE REQUIRED TO SECURE THE DEBRIS RACK TO THE TOP OF THE OUTLET TOWER. THE ANCHOR BOLTS SHALL BE PLACED ALONG THE TOP EDGE OF THE OUTLET TOWER WALL AT A DISTANCE EQUAL TO ONE FOURTH OF THE LENGTH OF OUTLET TOWER WALL (MEASURED ALONG THE SIDE WITH THE LARGER DIMENSION) FROM THE CORNER OF THE OUTLET TOWER.
9. CONCRETE OUTLET TOWER SHALL BE CONSTRUCTED WITH PERMANENT MARKINGS ON THE SIDE OF THE TOWER WALLS TO INDICATE THE BASIN INVERT LOCATION AND ELEVATION. ADDITIONAL MARKINGS SHALL BE ADDED ABOVE THIS LOCATION/ELEVATION AT ONE-FOOT INCREMENTS (VERTICALLY).
10. FOR VERTICAL MEMBERS WITH A SPAN LENGTH GREATER THAN 6-FEET, A STIFFENER BEAM (3" WIDE X 3/8" THICK STAINLESS STEEL FLAT BAR) SHALL BE WELDED AT THE MID-SPAN OF THE VERTICAL MEMBERS. WELDS SHALL BE 1/4" AT ALL JOINTS, TYP.
11. CONCRETE FOR OUTLET TOWER SHALL BE 560-C-3250 PER GREENBOOK SPECIFICATIONS SECTION 201-1.1.2 AND PER OCPW STD. PLAN 1803.
12. REINFORCING STEEL SHALL BE GRADE 60 IN ACCORDANCE WITH ASTM A615 PER OCPW STD. PLAN 1803.
13. GRAVEL BASE FOUNDATION SHALL BE NO. 3 ROCK (12" MIN. LAYER THICKNESS) WRAPPED IN FABRIC PER OCPW STD. PLANS 1803 AND 1808, OR EQUIVALENT PER PROJECT GEOTECHNICAL ENGINEER RECOMMENDATION.
14. STAINLESS STEEL FOR DEBRIS RACK SHALL BE PER ASTM A276.
15. MANHOLE STEPS SHALL BE POLYPROPYLENE MANUFACTURED BY LANE INTERNATIONAL (MODEL P-14938), OR EQUIVALENT AS APPROVED BY OCPW. VERTICAL SPACING OF MANHOLE STEPS SHALL BE IN ACCORDANCE WITH OCPW STANDARD PLAN 1507.

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Approved


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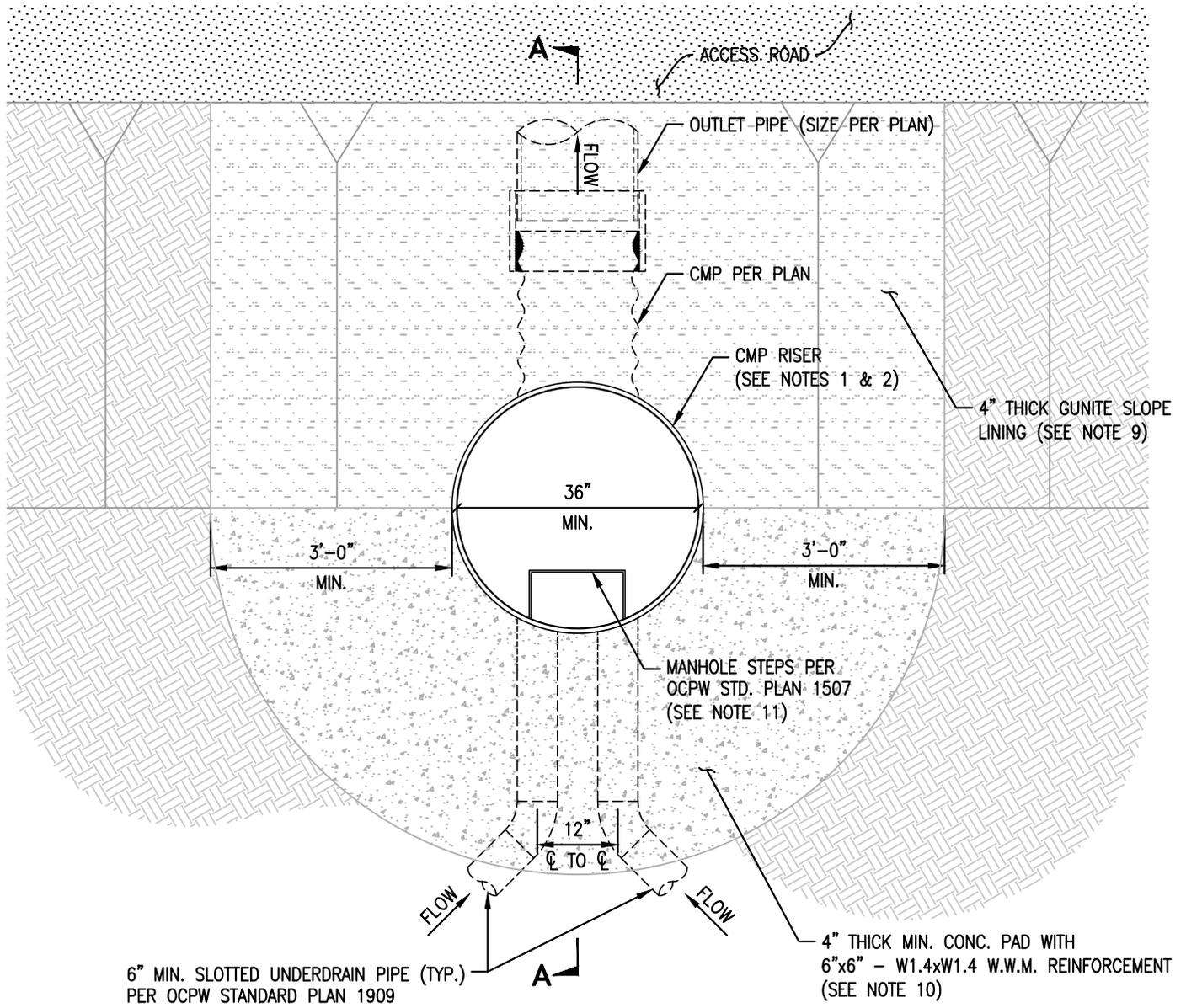
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BIOINFILTRATION BASIN OVERFLOW TOWER & UNDERDRAIN

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6" MIN. SLOTTED UNDERDRAIN PIPE (TYP.)
PER OCPW STANDARD PLAN 1909

PLAN

SCALE: 1/2" = 1'-0"

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Kevin Onuma, County Engineer

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BIOINFILTRATION BASIN OVERFLOW METAL STANDPIPE RISER

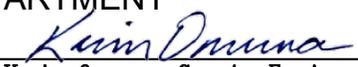
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NOTES:

1. VERTICAL STANDPIPE RISER IS FOR CONTROLLED WATER OUTLET AND OVERFLOW. STANDPIPE RISER HAS A CONCRETE FOUNDATION TO SUPPORT THE BOTTOM OF THE PIPE. METAL STANDPIPE RISER SHALL BE 14 GAUGE (MINIMUM) CMP, OR ALTERNATE APPROVED BY OCPW, AND SHALL INCLUDE PERMANENT MARKINGS ON THE SIDE OF THE RISER WALLS TO INDICATE THE BASIN INVERT LOCATION AND ELEVATION. ADDITIONAL MARKINGS SHALL BE ADDED ABOVE THIS LOCATION/ELEVATION AT ONE-FOOT INCREMENTS (VERTICALLY).
2. THE CREST OF THE STANDPIPE RISER IS DETERMINED BASED ON THE MAXIMUM PONDING DEPTH TO ACCOMMODATE OVERFLOW ONCE THE WATER QUALITY VOLUME (WQV) STORAGE IS EXCEEDED.
3. MAXIMUM DEPTH OF FLOW OVER THE STANDPIPE RISER BASED UPON CIRCULAR WEIR FLOW EQUATION AND FLOW THROUGH THE BIRDCAGE RACK.
4. DIAMETER OF THE METAL STANDPIPE RISER RELATIVE TO THE OUTLET PIPE DIAMETER SHALL BE BASED ON THE RELATIONSHIP OF 1.5 X OUTLET PIPE AREA = AREA OF RISER PIPE. NOTE THAT MINIMUM PIPE DIAMETERS ARE SPECIFIED FOR THE STANDPIPE RISER AND OUTLET PIPE.
5. OUTLET PIPE SHALL BE SIZED TO CONVEY THE MAXIMUM FLOW DELIVERED TO THE BASIN WHICH MAY EXCEED THE WATER QUALITY FLOW RATE AND IS CONTROLLED BY DIVERSION STRUCTURE DESIGN
6. AN INCLINED, REMOVABLE DEBRIS CAGE SIMILAR TO A CONVENTIONAL "BIRDCAGE" RACK IS PROVIDED ON TOP OF THE METAL STANDPIPE RISER TO PREVENT DEBRIS FROM ENTERING AND CLOGGING THE BASIN OUTFLOW PIPE. DEBRIS CAGE SHALL BE CONSTRUCTED OF #4 STEEL REBAR WITH A 6" ON CENTER MAXIMUM SPACING AND SHALL BE SECURED TO THE PIPE WITH A ½" THK. AND 2" WIDE STEEL STRAP PER OCPW STD. PLAN 1327. STEEL REBAR SHALL BE GRADE 60 PER ASTM A615 AND SHALL BE WELDED WITH A ⅜" WELD ON BOTH SIDES OF ALL JOINTS.
7. FOR BASINS WITH MULCH, A 2 X 2 (½" OPENING) STEEL MESH SCREEN SHALL BE WELDED TO THE DEBRIS CAGE TO PREVENT FLOATING DEBRIS FROM EXITING THE BASIN.
8. DEBRIS CAGE SHALL BE GALVANIZED AFTER FABRICATION AND PRIOR TO INSTALLATION. GALVANIZATION SHALL BE PERFORMED IN ACCORDANCE WITH GREENBOOK SPECIFICATIONS SECTIONS 210-3. HARDWARE USED TO SECURE TRASH RACK TO STANDPIPE RISER SHALL ALSO BE GALVANIZED.
9. GUNITE (AIR-PLACED CONCRETE) SLOPE LINING SHALL BE CONSTRUCTED WITH A 6-INCH X 6-INCH - W1.4 X W1.4 WELDED WIRE MESH REINFORCEMENT CENTERED WITHIN THE CONCRETE. THE GUNITE SLOPE LINING SHALL HAVE A TRANSVERSE RAKED FINISH, AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH GREENBOOK SPECIFICATIONS SECTION 303-2, METHOD A.
10. CONCRETE PAD SHALL BE CONSTRUCTED WITH A 6-INCH X 6-INCH - W1.4 X W1.4 WELDED WIRE MESH REINFORCEMENT CENTERED WITHIN THE CONCRETE SLAB. THE CONCRETE PAD SHALL HAVE A TRANSVERSE RAKED FINISH, AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH OCPW STANDARD PLAN 1803.
11. MANHOLE STEPS/RUNGS SHALL BE PER OCPW STD. PLAN 1507. STEPS SHALL BE MODIFIED TO ALLOW FOR BOLT-ON INSTALLATION USING THE APPROPRIATE HARDWARE (BOLTS/NUTS). HARDWARE USED TO SECURE STEPS TO STANDPIPE RISER SHALL BE GALVANIZED.
12. GRAVEL BASE FOUNDATION SHALL BE NO. 3 ROCK (12" MIN. LAYER THICKNESS) WRAPPED IN FABRIC PER OCPW STD. PLANS 1803 AND 1808, OR EQUIVALENT PER PROJECT GEOTECHNICAL ENGINEER RECOMMENDATION.
13. FOR OUTLET TOWER HEIGHT (H) GREATER THAN 42" USE OCPW STANDARD PLAN 1911.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved


Kevin Onuma, County Engineer

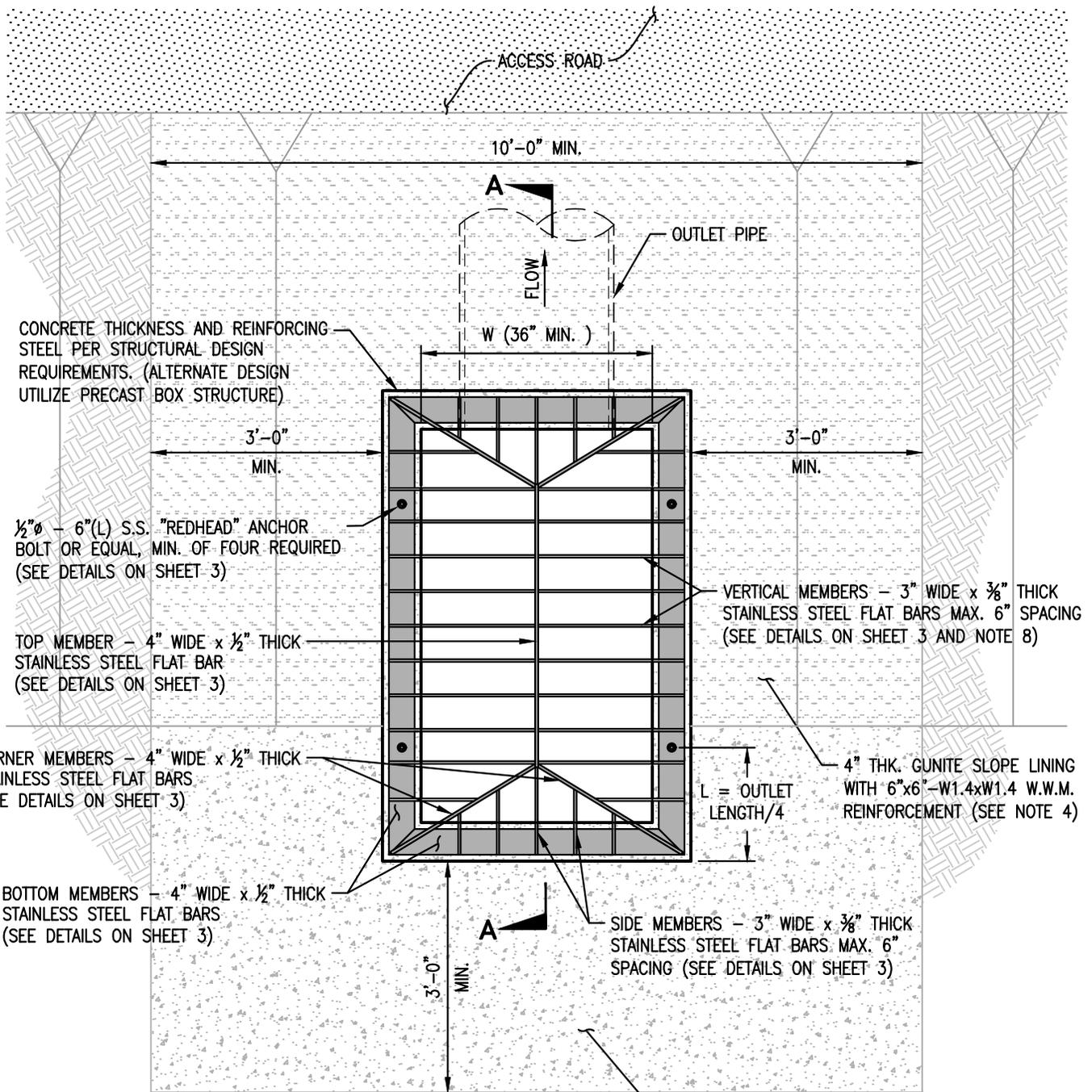
May 2021

STD. PLAN

1912

BIOINFILTRATION BASIN OVERFLOW METAL STANDPIPE RISER

SHT. 3 OF 3



PLAN
N.T.S.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

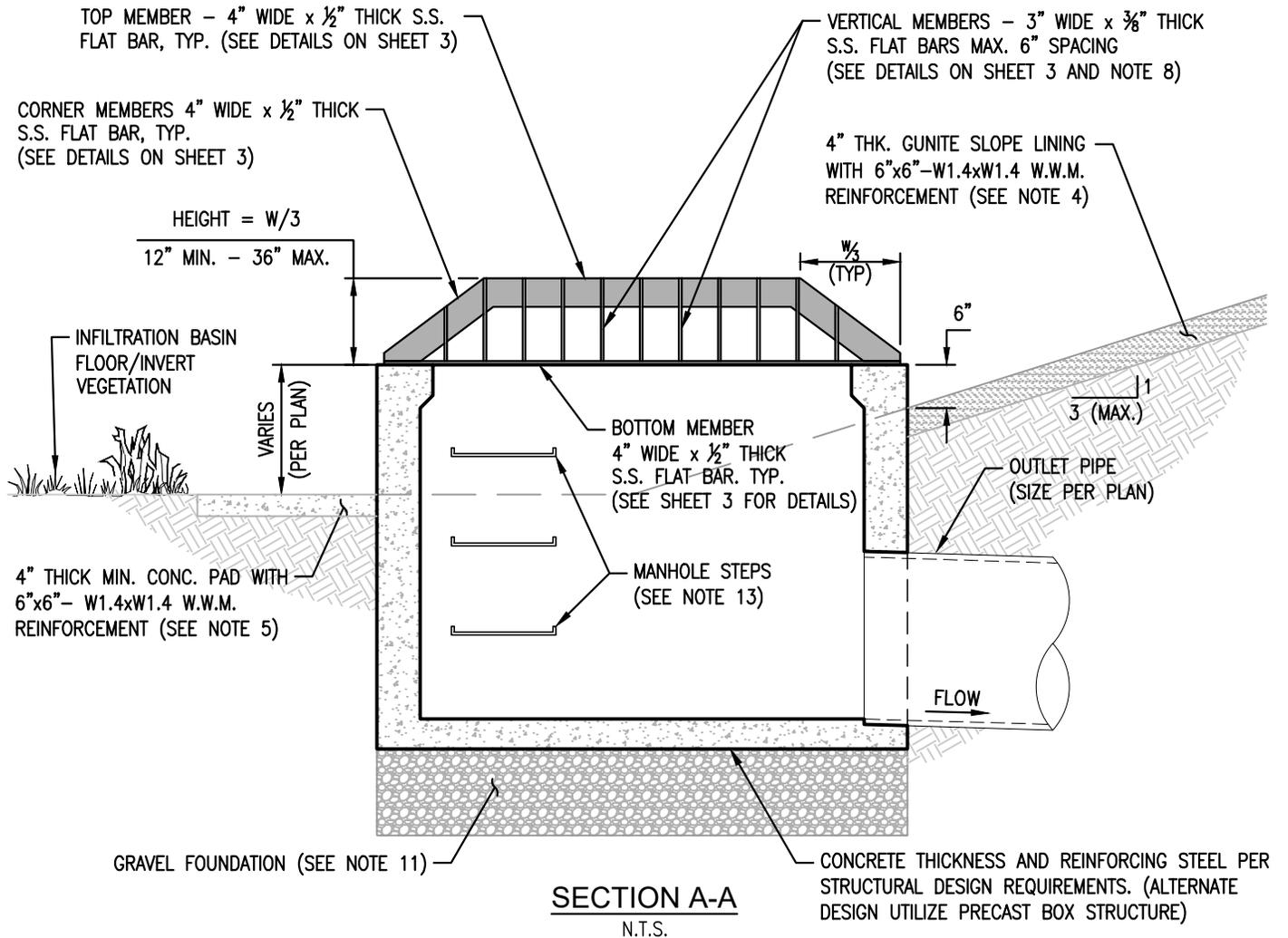
May 2021

STD. PLAN

1913

INFILTRATION BASIN OVERFLOW TOWER

SHT. 1 OF 4



COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

May 2021

STD. PLAN

1913

INFILTRATION BASIN OVERFLOW TOWER

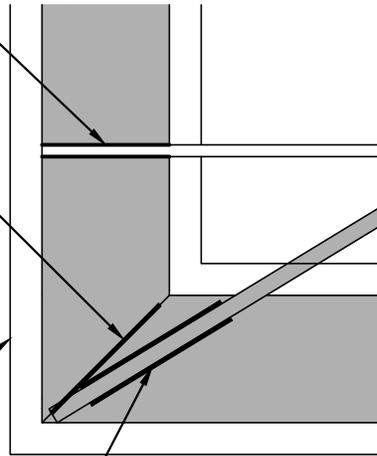
SHT. 2 OF 4

3" WIDE x $\frac{3}{8}$ " THICK S.S. VERTICAL MEMBER WITH $\frac{1}{4}$ " WELD AT BOTTOM MEMBER JOINTS (BOTH SIDES, TYP.)

4" WIDE x $\frac{1}{2}$ " THICK S.S. BOTTOM MEMBER WITH $\frac{3}{16}$ " WELD AT JOINTS (TOP AND BOTTOM OF JOINT TYP.)

CONCRETE OUTLET TOWER WALL

4" WIDE x $\frac{1}{2}$ " THICK S.S. CORNER MEMBER WITH $\frac{1}{4}$ " WELD AT BOTTOM MEMBER JOINTS (BOTH SIDES, TYP.)



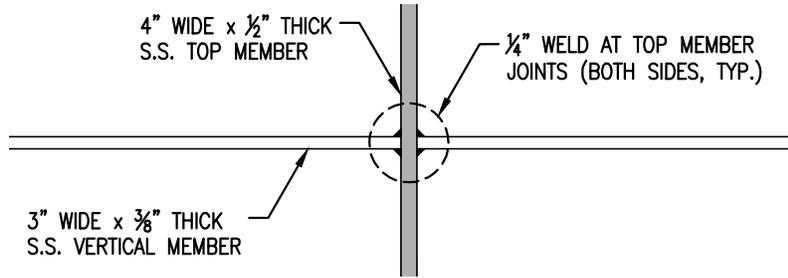
DETAIL - A (TYP.)

N.T.S.

4" WIDE x $\frac{1}{2}$ " THICK S.S. TOP MEMBER

$\frac{1}{4}$ " WELD AT TOP MEMBER JOINTS (BOTH SIDES, TYP.)

3" WIDE x $\frac{3}{8}$ " THICK S.S. VERTICAL MEMBER



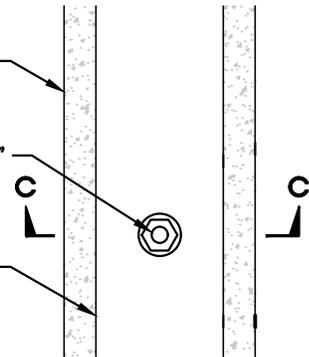
DETAIL - B (TYP.)

N.T.S.

CONCRETE OUTLET TOWER WALL

$\frac{1}{2}$ " ϕ - 6"(L) S.S. "REDHEAD" ANCHOR BOLT OR EQUAL

4" WIDE x $\frac{1}{2}$ " THICK S.S. BOTTOM MEMBER (TYP.)



DETAIL - C (TYP.)

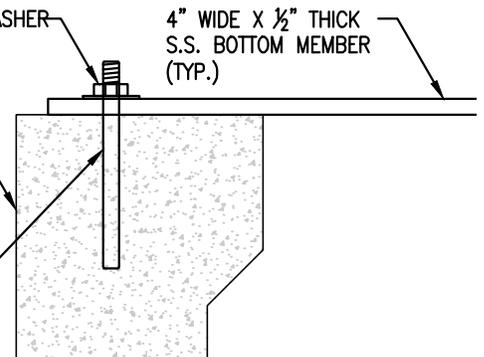
N.T.S.

S.S. NUT AND WASHER

4" WIDE x $\frac{1}{2}$ " THICK S.S. BOTTOM MEMBER (TYP.)

CONCRETE OUTLET TOWER WALL

$\frac{1}{2}$ " ϕ - 6"(L) S.S. "REDHEAD" ANCHOR BOLT OR EQUAL



SECTION C-C

N.T.S.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

May 2021

STD. PLAN

1913

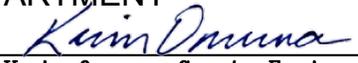
INFILTRATION BASIN OVERFLOW TOWER

SHT. 3 OF 4

NOTES:

1. REINFORCED CONCRETE OUTLET TOWER PROVIDES A PERMANENT LOW MAINTENANCE FACILITY TO REGULATE FLOWS LEAVING THE BASIN. THE HEIGHT OF TOWER REFLECTS THE PERMANENT RETENTION POOL DEPTH. THE DEPTH OF THE TOWER BELOW THE BASIN FLOOR EXTENDS TO THE INVERT ELEVATION OF THE OUTLET PIPE. THE CONCRETE TOWER CAN BE CAST-IN-PLACE OR PRECAST CONCRETE.
2. THE CREST OF THE OUTLET TOWER IS DETERMINED BASED ON THE MAXIMUM PONDING DEPTH TO ACCOMMODATE OVERFLOW ONCE THE WATER QUALITY VOLUME (WQV) STORAGE IS EXCEEDED. DIMENSIONS FOR THE LENGTH AND WIDTH OF THE RECTANGULAR OUTLET TOWER ARE BASED ON OVERFLOW HYDRAULICS ASSUMING WEIR FLOW OVER THE OPEN TOP PORTION OF THE TOWER. ADDITIONALLY, THE WIDTH OF THE TOWER MUST BE ABLE TO ACCOMMODATE THE DIAMETER OF THE BASIN OUTFLOW PIPE.
3. AN INCLINED, REMOVABLE STAINLESS STEEL DEBRIS RACK SIMILAR TO A CONVENTIONAL "BIRDCAGE" RACK IS PROVIDED ON TOP OF THE CONCRETE OUTLET TOWER TO PREVENT DEBRIS FROM ENTERING AND CLOGGING THE BASIN OUTFLOW PIPE.
4. GUNITE (AIR-PLACED CONCRETE) SLOPE LINING SHALL BE CONSTRUCTED WITH A 6-INCH X 6-INCH - W1.4 X W1.4 WELDED WIRE MESH REINFORCEMENT CENTERED WITHIN THE CONCRETE. THE GUNITE SLOPE LINING SHALL HAVE A TRANSVERSE RAKED FINISH, AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH GREENBOOK SPECIFICATIONS SECTION 303-2, METHOD A.
5. CONCRETE PAD SHALL BE CONSTRUCTED WITH A 6-INCH X 6-INCH - W1.4 X W1.4 WELDED WIRE MESH REINFORCEMENT CENTERED WITHIN THE CONCRETE SLAB. THE CONCRETE PAD SHALL HAVE A TRANSVERSE RAKED FINISH, AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH OCPW STANDARD PLAN 1803.
6. MINIMUM OF FOUR (TWO ON EACH SIDE) "REDHEAD" ANCHOR BOLTS, OR EQUIVALENT, ARE REQUIRED TO SECURE THE DEBRIS RACK TO THE TOP OF THE OUTLET TOWER. THE ANCHOR BOLTS SHALL BE PLACED ALONG THE TOP EDGE OF THE OUTLET TOWER WALL AT A DISTANCE EQUAL TO ONE FOURTH OF THE LENGTH OF OUTLET TOWER WALL (MEASURED ALONG THE SIDE WITH THE LARGER DIMENSION) FROM THE CORNER OF THE OUTLET TOWER.
7. CONCRETE OUTLET TOWER SHALL BE CONSTRUCTED WITH PERMANENT MARKINGS ON THE SIDE OF THE TOWER WALLS TO INDICATE THE BASIN INVERT LOCATION AND ELEVATION. ADDITIONAL MARKINGS SHALL BE ADDED ABOVE THIS LOCATION/ELEVATION AT ONE-FOOT INCREMENTS (VERTICALLY).
8. FOR VERTICAL MEMBERS WITH A SPAN LENGTH GREATER THAN 6- FEET, A STIFFENER BEAM (3" WIDE X 3/8" THICK STAINLESS STEEL FLAT BAR) SHALL BE WELDED AT THE MID-SPAN OF THE VERTICAL MEMBERS. WELDS SHALL BE 1/4" AT ALL JOINTS, TYP.
9. CONCRETE FOR OUTLET TOWER SHALL BE 560-C-3250 PER GREENBOOK SPECIFICATIONS SECTION 201-1.1.2 AND PER OCPW STD. PLAN 1803.
10. REINFORCING STEEL SHALL BE GRADE 60 IN ACCORDANCE WITH ASTM A615 PER OCPW STD. PLAN 1803.
11. GRAVEL BASE FOUNDATION SHALL BE NO. 3 ROCK (12" MIN. LAYER THICKNESS) WRAPPED IN FABRIC PER OCPW STD. PLANS 1803 AND 1808, OR EQUIVALENT PER PROJECT GEOTECHNICAL ENGINEER RECOMMENDATION.
12. STAINLESS STEEL FOR DEBRIS RACK SHALL BE PER ASTM A276.
13. MANHOLE STEPS SHALL BE POLYPROPYLENE MANUFACTURED BY LANE INTERNATIONAL (MODEL P-14938), OR EQUIVALENT AS APPROVED BY OCPW. VERTICAL SPACING OF MANHOLE STEPS SHALL BE IN ACCORDANCE WITH OCPW STANDARD PLAN 1507.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved 
Kevin Onuma, County Engineer

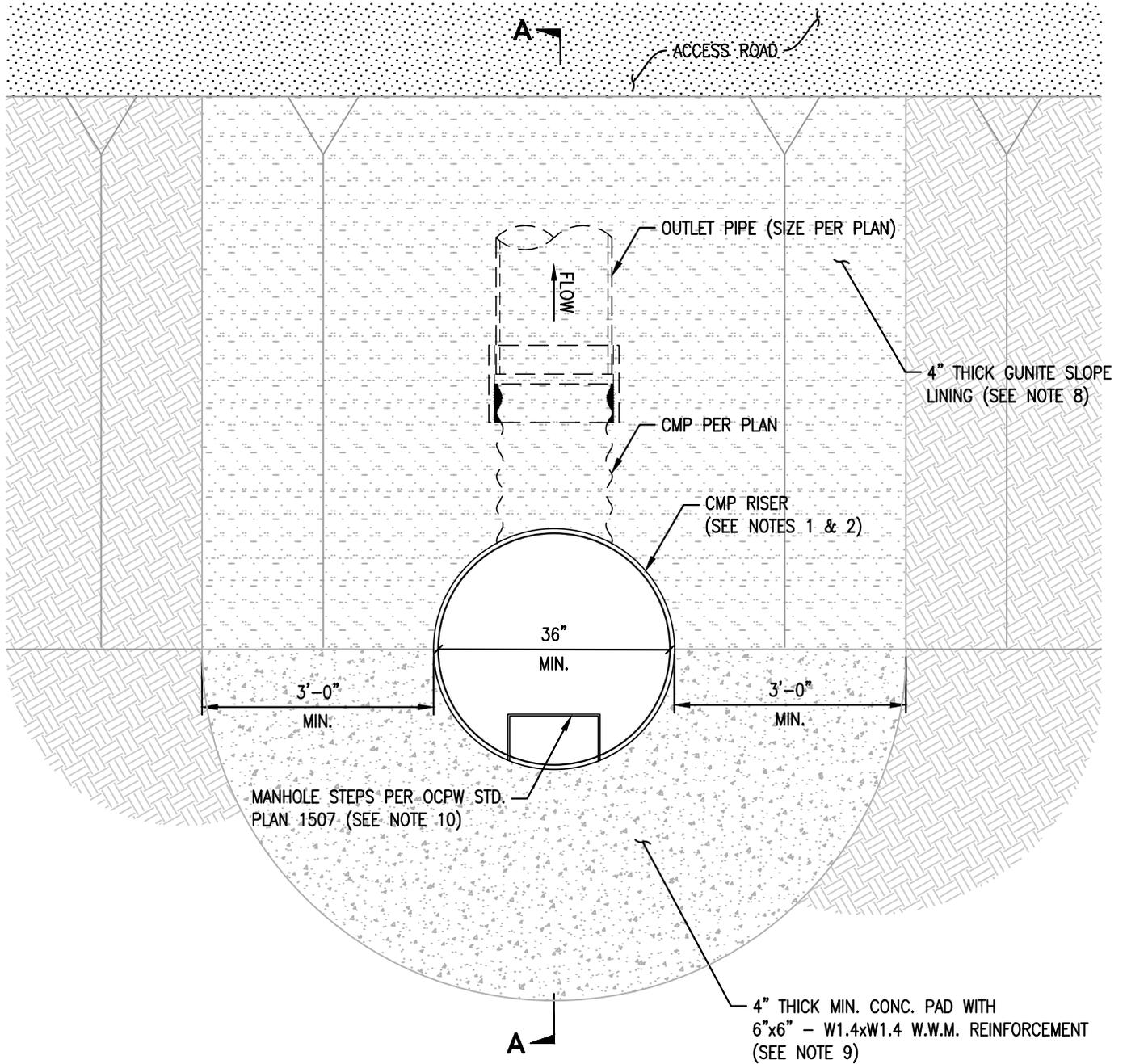
May 2021

STD. PLAN

1913

INFILTRATION BASIN OVERFLOW TOWER

SHT. 4 OF 4



PLAN
SCALE: 1/2" = 1'-0"

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

May 2021

STD. PLAN

1914

INFILTRATION BASIN OVERFLOW METAL STANDPIPE RISER

SHT. 1 OF 3

NOTES:

1. VERTICAL STANDPIPE RISER IS FOR CONTROLLED WATER OUTLET AND OVERFLOW. STANDPIPE RISER HAS A CONCRETE FOUNDATION TO SUPPORT THE BOTTOM OF THE PIPE. METAL STANDPIPE RISER SHALL BE 14 GAUGE (MINIMUM) CMP, OR ALTERNATE APPROVED BY OCPW, AND SHALL INCLUDE PERMANENT MARKINGS ON THE SIDE OF THE RISER WALLS TO INDICATE THE BASIN INVERT LOCATION AND ELEVATION. ADDITIONAL MARKINGS SHALL BE ADDED ABOVE THIS LOCATION/ELEVATION AT ONE-FOOT INCREMENTS (VERTICALLY).
2. THE CREST OF THE STANDPIPE RISER IS DETERMINED BASED ON THE MAXIMUM PONDING DEPTH TO ACCOMMODATE OVERFLOW ONCE THE WATER QUALITY VOLUME (WQV) STORAGE IS EXCEEDED.
3. MAXIMUM DEPTH OF FLOW OVER THE STANDPIPE RISER BASED UPON CIRCULAR WEIR FLOW EQUATION AND FLOW THROUGH THE BIRDCAGE RACK.
4. DIAMETER OF THE METAL STANDPIPE RISER RELATIVE TO THE OUTLET PIPE DIAMETER SHALL BE BASED ON THE RELATIONSHIP OF 1.5 X OUTLET PIPE AREA = AREA OF RISER PIPE. NOTE THAT MINIMUM PIPE DIAMETERS ARE SPECIFIED FOR THE STANDPIPE RISER AND OUTLET PIPE.
5. OUTLET PIPE SHALL BE SIZED TO CONVEY THE MAXIMUM FLOW DELIVERED TO THE BASIN WHICH MAY EXCEED THE WATER QUALITY FLOW RATE AND IS CONTROLLED BY DIVERSION STRUCTURE DESIGN
6. AN INCLINED, REMOVABLE DEBRIS CAGE SIMILAR TO A CONVENTIONAL "BIRDCAGE" RACK IS PROVIDED ON TOP OF THE METAL STANDPIPE RISER TO PREVENT DEBRIS FROM ENTERING AND CLOGGING THE BASIN OUTFLOW PIPE. DEBRIS CAGE SHALL BE CONSTRUCTED OF #4 STEEL REBAR WITH A 6" ON CENTER MAXIMUM SPACING AND SHALL BE SECURED TO THE PIPE WITH A 1/2" THK. AND 2" WIDE STEEL STRAP PER OCPW STD. PLAN 1327. STEEL REBAR SHALL BE GRADE 60 PER ASTM A615 AND SHALL BE WELDED WITH A 3/16" WELD ON BOTH SIDES OF ALL JOINTS.
7. DEBRIS CAGE SHALL BE GALVANIZED AFTER FABRICATION AND PRIOR TO INSTALLATION. GALVANIZATION SHALL BE PERFORMED IN ACCORDANCE WITH GREENBOOK SPECIFICATIONS SECTIONS 210-3. HARDWARE USED TO SECURE TRASH RACK TO STANDPIPE RISER SHALL ALSO BE GALVANIZED.
8. GUNITE (AIR-PLACED CONCRETE) SLOPE LINING SHALL BE CONSTRUCTED WITH A 6-INCH X 6-INCH - W1.4 X W1.4 WELDED WIRE MESH REINFORCEMENT CENTERED WITHIN THE CONCRETE. THE GUNITE SLOPE LINING SHALL HAVE A TRANSVERSE RAKED FINISH, AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH GREENBOOK SPECIFICATIONS SECTION 303-2, METHOD A.
9. CONCRETE PAD SHALL BE CONSTRUCTED WITH A 6-INCH X 6-INCH - W1.4 X W1.4 WELDED WIRE MESH REINFORCEMENT CENTERED WITHIN THE CONCRETE SLAB. THE CONCRETE PAD SHALL HAVE A TRANSVERSE RAKED FINISH, AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH OCPW STANDARD PLAN 1803.
10. MANHOLE STEPS/RUNGS SHALL BE PER OCPW STD. PLAN 1507. STEPS SHALL BE MODIFIED TO ALLOW FOR BOLT-ON INSTALLATION USING THE APPROPRIATE HARDWARE (BOLTS/NUTS). HARDWARE USED TO SECURE STEPS TO STANDPIPE RISER SHALL BE GALVANIZED.
11. GRAVEL BASE FOUNDATION SHALL BE NO. 3 ROCK (12" MIN. LAYER THICKNESS) WRAPPED IN FABRIC PER OCPW STD. PLANS 1803 AND 1808, OR EQUIVALENT PER PROJECT GEOTECHNICAL ENGINEER RECOMMENDATION.
12. FOR OUTLET TOWER HEIGHT (H) GREATER THAN 42" USE OCPW STANDARD PLAN 1913.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved 
Kevin Onuma, County Engineer

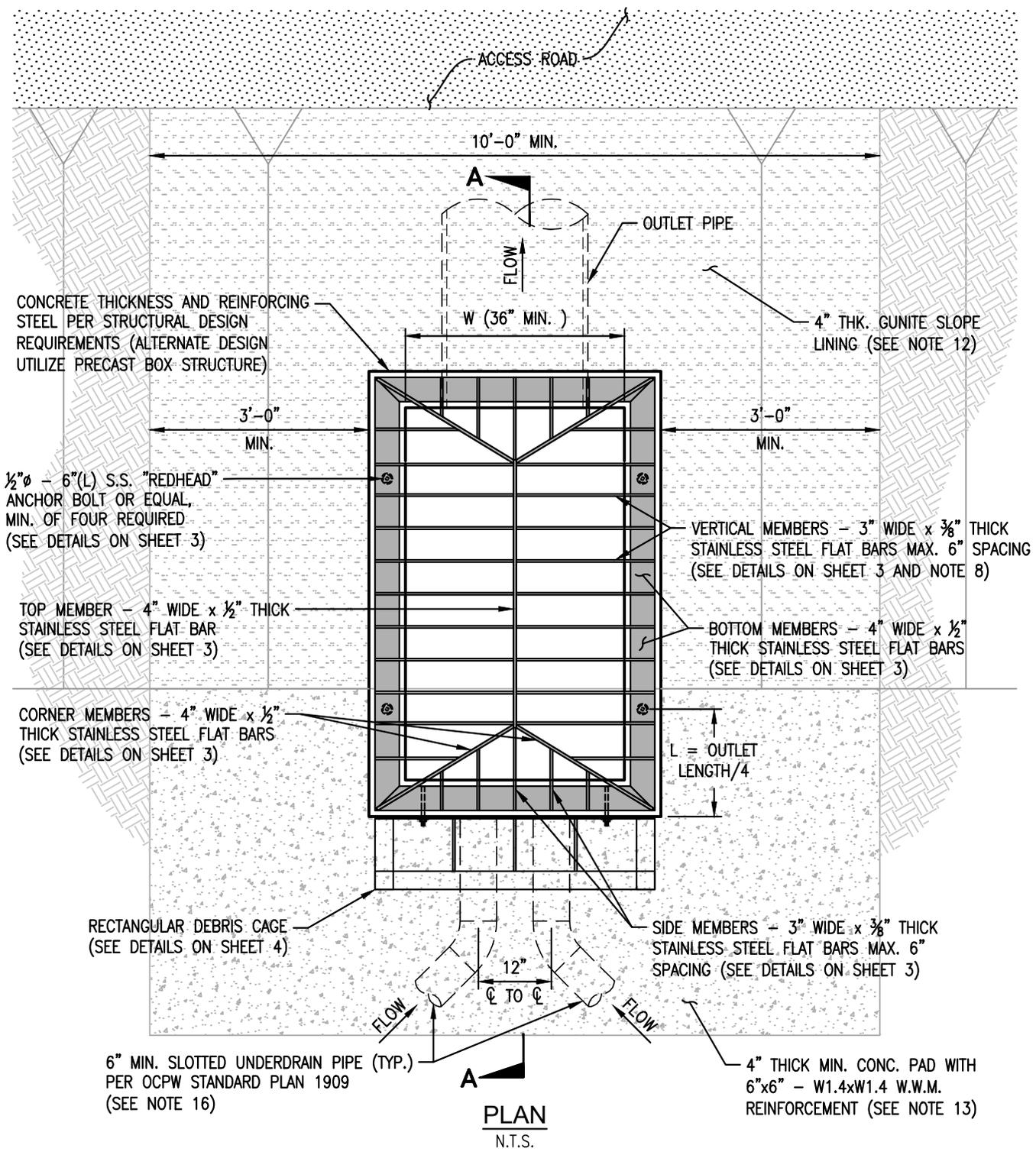
May 2021

STD. PLAN

1914

INFILTRATION BASIN OVERFLOW METAL STANDPIPE RISER

SHT. 3 OF 3



COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
 Kevin Onuma, County Engineer

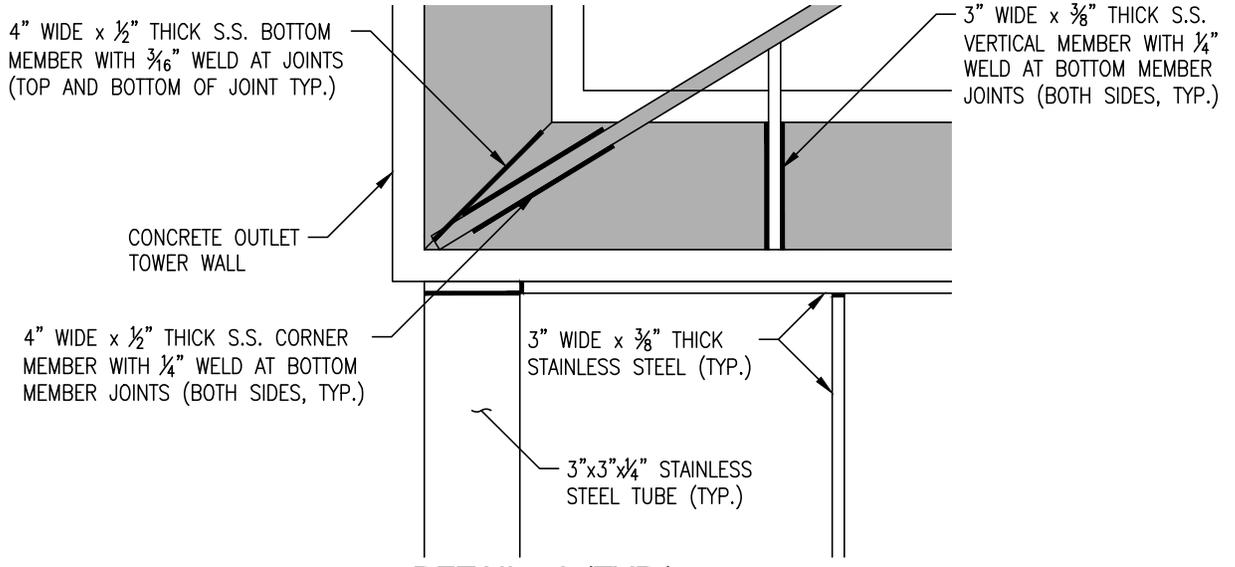
May 2021

STD. PLAN

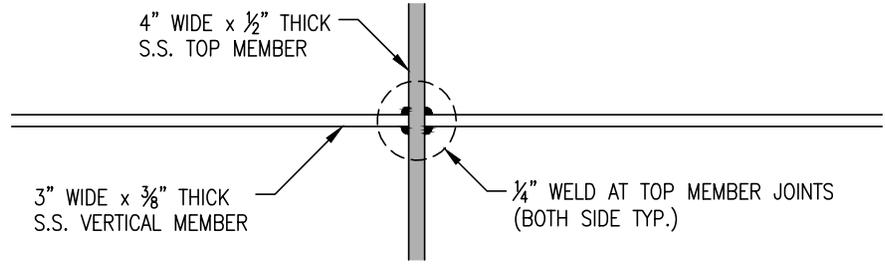
1915

HYDROMOD BASIN CONCRETE OVERFLOW TOWER

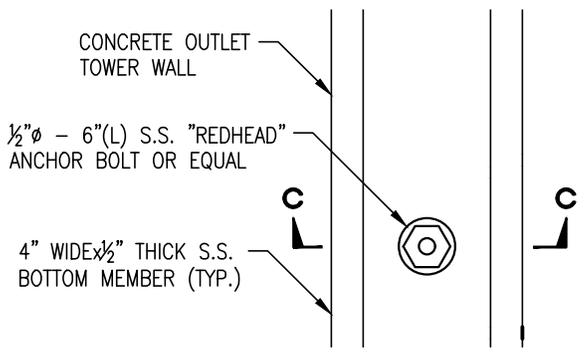
SHT. 1 OF 5



DETAIL - A (TYP.)
N.T.S.



DETAIL - B (TYP.)
N.T.S.



DETAIL - C (TYP.)
N.T.S.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

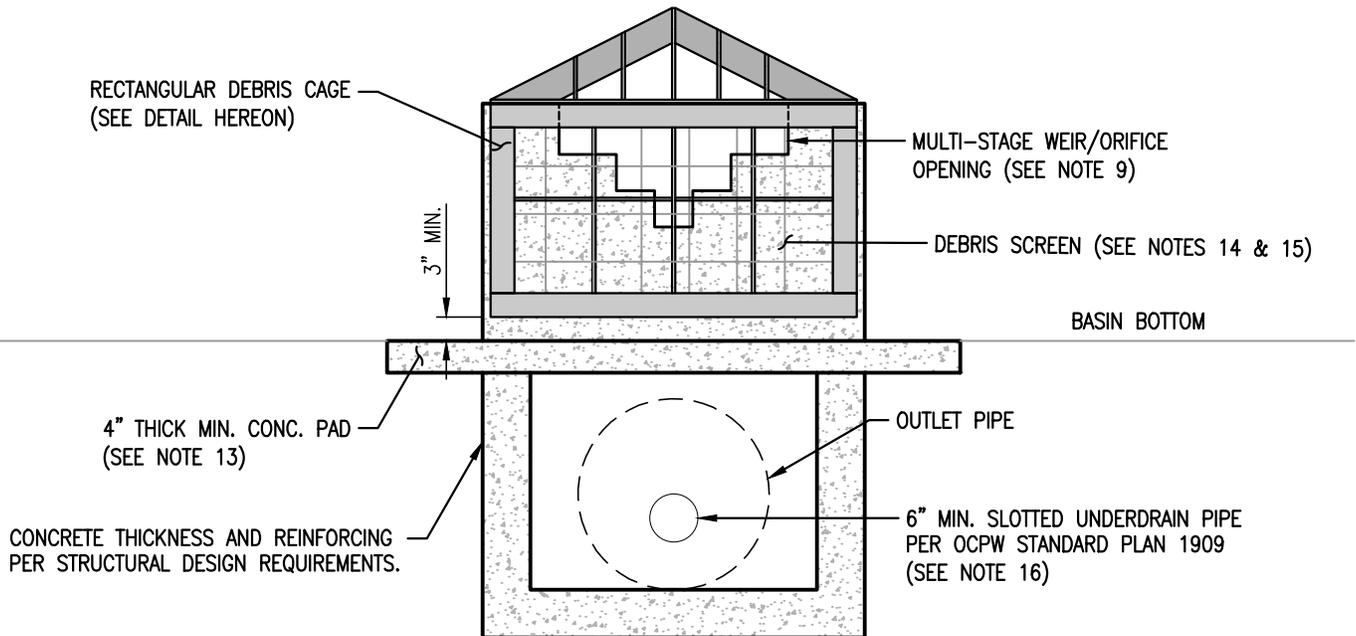
May 2021

STD. PLAN

1915

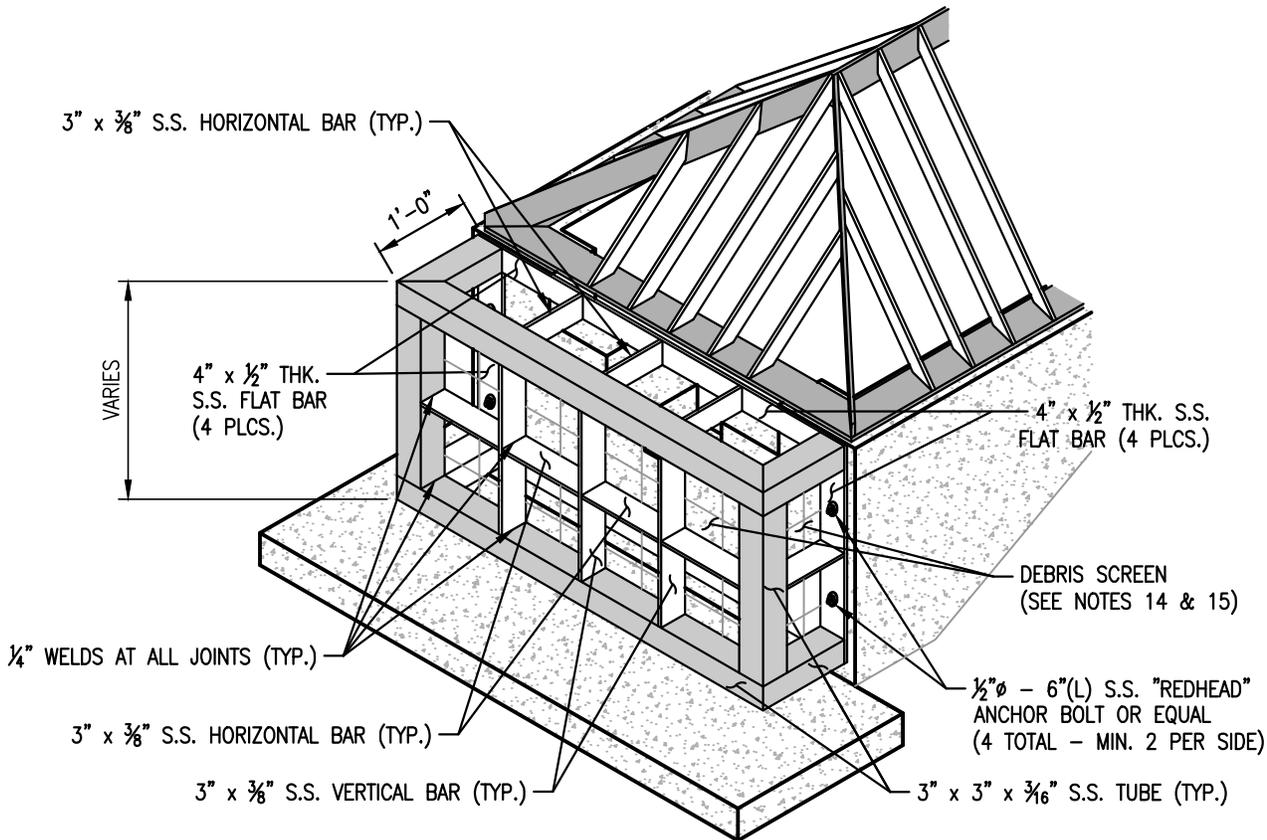
HYDROMOD BASIN CONCRETE OVERFLOW TOWER

SHT. 3 OF 5



SECTION B-B

SCALE: $\frac{1}{4}" = 1'-0"$



RECTANGULAR DEBRIS CAGE

N.T.S.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

May 2021

STD. PLAN

1915

HYDROMOD BASIN CONCRETE OVERFLOW TOWER

SHT. 4 OF 5

NOTES:

1. REINFORCED CONCRETE OUTLET TOWER WITH MULTI-STAGE WEIR/ORIFICE OPENINGS PROVIDE A PERMANENT LOW MAINTENANCE FACILITY TO REGULATE FLOWS LEAVING THE BASIN. DIMENSIONS FOR THE LENGTH AND WIDTH OF THE RECTANGULAR ARE BASED ON THE OVERFLOW HYDRAULICS ASSUMING WEIR FLOW OVER THE OPEN TOP PORTION. IN ADDITION, THE MINIMUM WIDTH MUST BE ABLE TO ACCOMMODATE THE DIAMETER OF THE BASIN OUTFLOW PIPE. THE DEPTH OF THE TOWER BELOW THE BASIN FLOOR EXTENDS TO THE INVERT ELEVATION OF THE OUTLET PIPE. THE CONCRETE TOWER CAN BE CAST-IN-PLACE OR PRECAST CONCRETE.
2. REINFORCED CONCRETE OUTLET TOWER SHALL BE CONSTRUCTED WITH PERMANENT MARKINGS ON THE SIDE OF THE TOWER WALLS TO INDICATE THE BASIN INVERT LOCATION AND ELEVATION. ADDITIONAL MARKINGS SHALL BE ADDED ABOVE THIS LOCATION/ELEVATION AT ONE-FOOT INCREMENTS (VERTICALLY)
3. CONCRETE SHALL BE 560-C-3250 PER GREENBOOK SPECIFICATIONS SECTION 201-1.1.2 AND PER OCPW STD. PLAN 1803.
4. REINFORCING STEEL SHALL BE GRADE 60 IN ACCORDANCE WITH ASTM PER OCPW STANDARD PLAN 1803.
5. GRAVEL BASE FOUNDATION SHALL BE NO. 3 ROCK (12" MIN. LAYER THICKNESS) WRAPPED IN FABRIC PER OCPW STANDARD PLAN 1803 AND 1808, OR EQUIVALENT PER PROJECT GEOTECHNICAL ENGINEER RECOMMENDATION.
6. AN INCLINED, REMOVABLE STAINLESS STEEL DEBRIS RACK SIMILAR TO A CONVENTIONAL "BIRDCAGE" RACK IS PROVIDED ON TOP OF THE CONCRETE OUTLET TOWER TO PREVENT DEBRIS FROM ENTERING AND CLOGGING THE BASIN OUTFLOW PIPE.
7. HARDWARE USED TO SECURE THE INCLINED DEBRIS RACK TO THE CONCRETE OUTLET TOWER SHALL BE STAINLESS STEEL. A MINIMUM OF FOUR (TWO ON EACH SIDE) REDHEAD ANCHOR BOLTS, OR EQUIVALENT, ARE REQUIRED TO SECURE THE DEBRIS RACK TO THE TOP OF THE OUTLET TOWER. THE ANCHOR BOLTS SHALL BE PLACED ALONG THE TOP EDGE OF THE OUTLET TOWER WALL AT A DISTANCE EQUAL TO ONE FOURTH OF THE LENGTH OF OUTLET TOWER WALL (MEASURED ALONG THE SIDE WITH THE LARGER DIMENSION) FROM THE CORNER OF THE OUTLET TOWER.
8. FOR VERTICAL MEMBERS WITH A SPAN LENGTH GREATER THAN 6- FEET, A STIFFENER BEAM (3" WIDE x 3/8" THICK STAINLESS STEEL FLAT BAR) SHALL BE WELDED AT THE MID-SPAN OF THE VERTICAL MEMBERS. WELDS SHALL BE 1/4" AT ALL JOINTS, TYP.
9. THE MULTI-STAGE WEIR/ORIFICE OPENINGS IN THE CONCRETE OUTLET TOWER SHALL BEGIN AT AN ELEVATION ABOVE REQUIRED STORM RETENTION VOLUME DEPTH, WHERE APPLICABLE RETENTION VOLUME MAY BE PROVIDED BELOW LOWEST OUTLET WEIR/ORIFICE. MULTI-STAGE WEIR/ORIFICE DIMENSIONS AND LOCATION ARE NON-STANDARD. DESIGNER SHALL PERFORM HYDRAULIC ANALYSIS TO DETERMINE DIMENSIONS AND LOCATION IN ORDER TO MODIFY BASIN OUTFLOWS FOR HYDROMODIFICATION PURPOSES.
10. A RECTANGULAR STAINLESS STEEL DEBRIS CAGE SHALL BE PROVIDED ON FRONT WALL OF CONCRETE OUTLET TOWER TO PREVENT SMALL FLOATING DEBRIS FROM EXITING BASIN AND CLOGGING MULTI-STAGE WEIR/ORIFICE. HARDWARE USED TO SECURE THE RECTANGULAR DEBRIS CAGE TO THE CONCRETE OUTLET TOWER SHALL BE STAINLESS STEEL. A MINIMUM OF FOUR (TWO ON EACH SIDE) "REDHEAD" ANCHOR BOLTS, OR EQUIVALENT, ARE REQUIRED TO SECURE THE DEBRIS CAGE TO THE SIDE OF THE OUTLET TOWER.
11. STAINLESS STEEL FOR THE INCLINED DEBRIS RACK AND RECTANGULAR DEBRIS CAGE SHALL BE PER ASTM A276.
12. GUNITE (AIR-PLACED CONCRETE) SLOPE LINING SHALL BE CONSTRUCTED WITH A 6-INCH x 6-INCH - W1.4 x W1.4 WELDED WIRE MESH REINFORCEMENT CENTERED WITHIN THE CONCRETE. THE GUNITE SLOPE LINING SHALL HAVE A TRANSVERSE RAKED FINISH, AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH GREENBOOK SPECIFICATIONS SECTION 303-2, METHOD A.
13. CONCRETE PAD SHALL BE CONSTRUCTED WITH A 6-INCH x 6-INCH - W1.4 x W1.4 WELDED WIRE MESH REINFORCED CENTERED WITHIN THE CONCRETE SLAB. THE CONCRETE PAD SHALL HAVE A TRANSVERSE RAKED FINISH, AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH OCPW STANDARD PLAN 1803.
14. FOR HYDROMODIFICATION BASIN, OR HYDROMOD/INFILTRATION COMBINATION BASINS, THE RECTANGULAR DEBRIS CAGE SHALL INCLUDE INSTALLATION OF A 6" x 6" x 0.224"Ø STAINLESS STEEL WELDED WIRE MESH ON ALL SIDES OF CAGE.
15. FOR HYDROMODIFICATION/BIOINFILTRATION COMBINATION BASINS, THE RECTANGULAR DEBRIS CAGE SHALL INCLUDE INSTALLATION OF A 2 x 2 (0.5" OPENING) STAINLESS STEEL MESH SCREEN ON ALL SIDES OF CAGE (ONLY IF HARDWOOD MULCH IS INSTALLED IN BASIN, OTHERWISE THE 6" x 6" x 0.224"Ø STAINLESS STEEL WELDED WIRE MESH CAN BE USED).
16. UNDERDRAIN ONLY REQUIRED FOR HYDROMODIFICATION/BIOINFILTRATION COMBINATION BASINS.
17. MANHOLE STEPS SHALL BE POLYPROPYLENE MANUFACTURED BY LANE INTERNATIONAL (MODEL P-14938), OR EQUIVALENT AS APPROVED BY OCPW. VERTICAL SPACING OF MANHOLE STEPS SHALL BE IN ACCORDANCE WITH OCPW STANDARD PLAN 1507.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved


Kevin Onuma, County Engineer

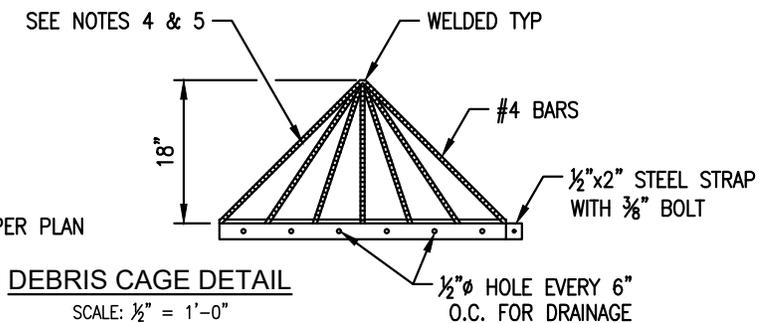
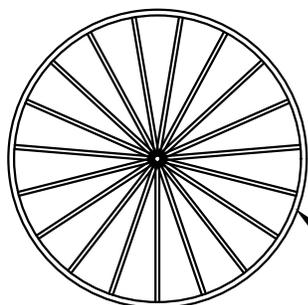
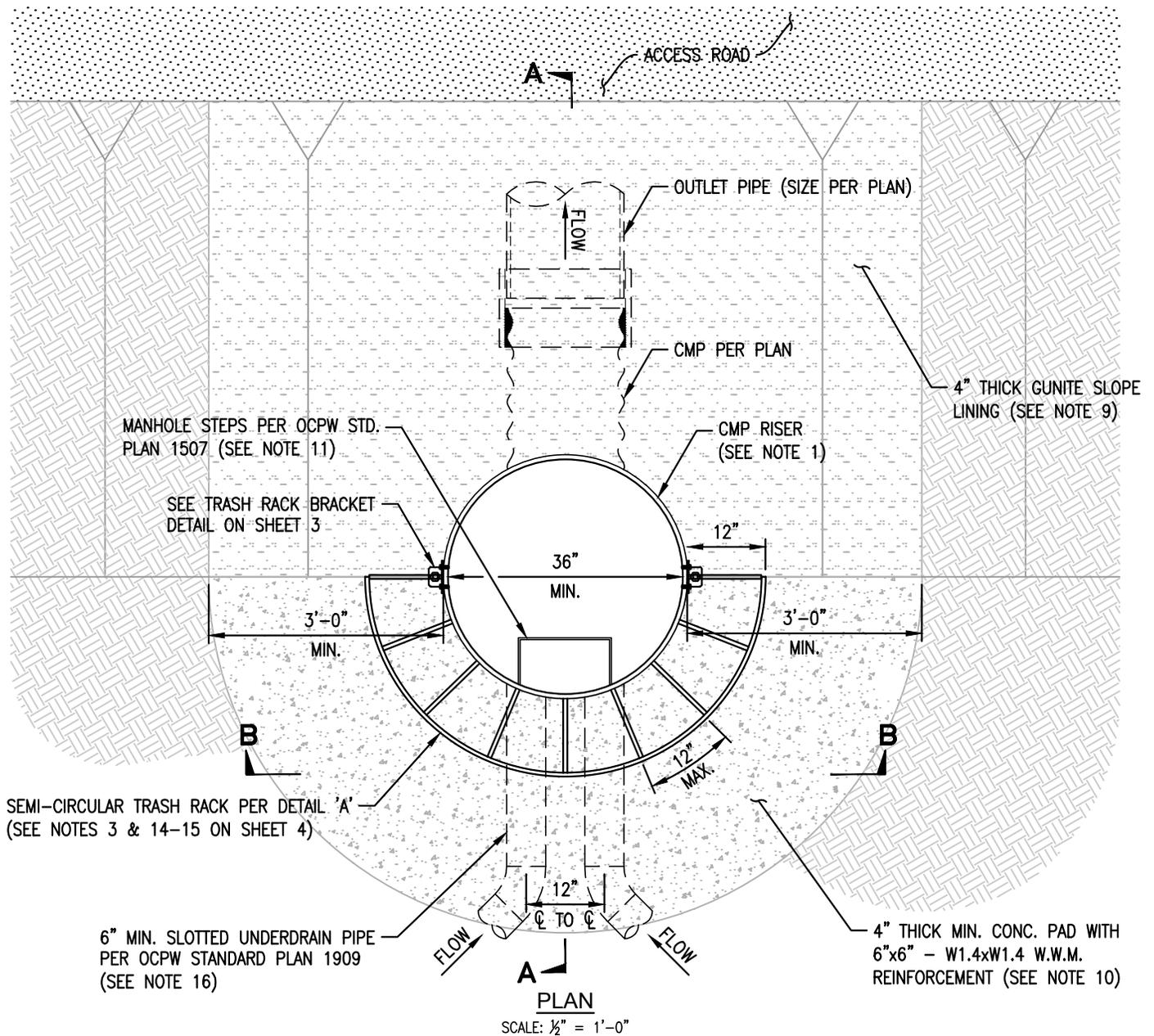
May 2021

STD. PLAN

1915

HYDROMOD BASIN CONCRETE OVERFLOW TOWER

SHT. 5 OF 5



COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

May 2021

STD. PLAN

1916

HYDROMOD BASIN OVERFLOW METAL STANDPIPE RISER

SHT. 1 OF 4

NOTES:

1. VERTICAL STANDPIPE RISER IS FOR CONTROLLED WATER OUTLET AND OVERFLOW. STANDPIPE RISER HAS A CONCRETE FOUNDATION TO SUPPORT THE BOTTOM OF THE PIPE. METAL STANDPIPE RISER SHALL BE 14 GAUGE (MINIMUM) CMP, OR ALTERNATE APPROVED BY OCPW, AND SHALL INCLUDE PERMANENT MARKINGS ON THE SIDE OF THE RISER WALLS TO INDICATE THE BASIN INVERT LOCATION AND ELEVATION. ADDITIONAL MARKINGS SHALL BE ADDED ABOVE THIS LOCATION/ELEVATION AT ONE-FOOT INCREMENTS (VERTICALLY).
2. MULTI-STAGE WEIR/ORIFICE IN THE PIPE RISER SHALL BEGIN AT AN ELEVATION ABOVE REQUIRED STORM RETENTION VOLUME DEPTH, WHERE APPLICABLE RETENTION VOLUME MAY BE PROVIDED BELOW LOWEST OUTLET WEIR/ORIFICE. MULTI-STAGE WEIR/ORIFICE DIMENSIONS AND LOCATION ARE NON-STANDARD. DESIGNER SHALL PERFORM HYDRAULIC ANALYSIS TO DETERMINE DIMENSIONS AND LOCATION IN ORDER TO MODIFY BASIN OUTFLOWS FOR HYDROMODIFICATION PURPOSES.
3. A SEMI-CIRCULAR GALVANIZED STEEL TRASH RACK SHALL BE PROVIDED ON FRONT HALF OF METAL STANDPIPE RISER TO PREVENT SMALL FLOATING DEBRIS FROM EXITING BASIN AND CLOGGING MULTI-STAGE WEIR/ORIFICE. THE SEMI-CIRCULAR TRASH RACK SHALL BE GALVANIZED AFTER FABRICATION AND PRIOR TO INSTALLATION. GALVANIZATION SHALL BE PERFORMED IN ACCORDANCE WITH GREENBOOK SPECIFICATIONS SECTIONS 210-3. MOUNTING PLATES AND HARDWARE USED TO SECURE TRASH RACK TO STANDPIPE RISER SHALL ALSO BE GALVANIZED.
4. AN INCLINED, REMOVABLE DEBRIS CAGE SIMILAR TO A CONVENTIONAL "BIRDCAGE" RACK IS PROVIDED ON TOP OF THE METAL STANDPIPE RISER TO PREVENT DEBRIS FROM ENTERING AND CLOGGING THE BASIN OUTFLOW PIPE. DEBRIS CAGE SHALL BE CONSTRUCTED OF #4 STEEL REBAR WITH A 6" ON CENTER MAXIMUM SPACING AND SHALL BE SECURED TO THE PIPE WITH A 1/2' THK. AND 2" WIDE STEEL STRAP PER OCPW STD. PLAN 1327. STEEL REBAR SHALL BE GRADE 60 PER ASTM A615 AND SHALL BE WELDED WITH A 3/16" WELD ON BOTH SIDES OF ALL JOINTS.
5. DEBRIS CAGE SHALL BE GALVANIZED AFTER FABRICATION AND PRIOR TO INSTALLATION. GALVANIZATION SHALL BE PERFORMED IN ACCORDANCE WITH GREENBOOK SPECIFICATIONS SECTIONS 210-3.
6. MAXIMUM DEPTH OF FLOW OVER THE STANDPIPE RISER BASED UPON CIRCULAR WEIR FLOW EQUATION AND FLOW THROUGH THE BIRDCAGE RACK.
7. DIAMETER OF THE METAL STANDPIPE RISER RELATIVE TO THE OUTLET PIPE DIAMETER SHALL BE BASED ON THE RELATIONSHIP OF 1.5 X OUTLET PIPE AREA = AREA OF RISER PIPE. NOTE THAT MINIMUM PIPE DIAMETERS ARE SPECIFIED FOR THE STANDPIPE RISER AND OUTLET PIPE.
8. OUTLET PIPE SHALL BE SIZED TO CONVEY THE MAXIMUM FLOW DELIVERED TO THE BASIN WHICH MAY EXCEED THE WATER QUALITY FLOW RATE AND IS CONTROLLED BY DIVERSION STRUCTURE DESIGN
9. GUNITE (AIR-PLACED CONCRETE) SLOPE LINING SHALL BE CONSTRUCTED WITH A 6-INCH X 6-INCH - W1.4 X W1.4 WELDED WIRE MESH REINFORCEMENT CENTERED WITHIN THE CONCRETE. THE GUNITE SLOPE LINING SHALL HAVE A TRANSVERSE RAKED FINISH, AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH GREENBOOK SPECIFICATIONS SECTION 303-2, METHOD A.
10. CONCRETE PAD SHALL BE CONSTRUCTED WITH A 6-INCH X 6-INCH - W1.4 X W1.4 WELDED WIRE MESH REINFORCEMENT CENTERED WITHIN THE CONCRETE SLAB. THE CONCRETE PAD SHALL HAVE A TRANSVERSE RAKED FINISH, AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH OCPW STANDARD PLAN 1803.
11. MANHOLE STEPS/RUNGS SHALL BE PER OCPW STD. PLAN 1507. STEPS SHALL BE MODIFIED TO ALLOW FOR BOLT-ON INSTALLATION USING THE APPROPRIATE HARDWARE (BOLTS/NUTS). HARDWARE USED TO SECURE STEPS TO STANDPIPE RISER SHALL BE GALVANIZED.
12. GRAVEL BASE FOUNDATION SHALL BE NO. 3 ROCK (12" MIN. LAYER THICKNESS) WRAPPED IN FABRIC PER OCPW STD. PLANS 1803 AND 1808, OR EQUIVALENT PER PROJECT GEOTECHNICAL ENGINEER RECOMMENDATION.
13. FOR OUTLET TOWER HEIGHT (H) GREATER THAN 42" USE OCPW STANDARD PLAN 1915.
14. FOR HYDROMODIFICATION BASIN, OR HYDROMOD/INFILTRATION COMBINATION BASINS, THE SEMI-CIRCULAR TRASH RACK SHALL INCLUDE INSTALLATION OF A 6" X 6" X 0.224"Ø STEEL WELDED WIRE MESH ON ALL SIDES OF TRASH RACK.
15. FOR HYDROMODIFICATION/BIOINFILTRATION COMBINATION BASINS, THE SEMI-CIRCULAR TRASH RACK SHALL INCLUDE INSTALLATION OF A 2 X 2 (0.5" OPENING) STEEL MESH SCREEN ON ALL SIDES OF TRASH RACK (ONLY IF HARDWOOD MULCH IS INSTALLED IN BASIN, OTHERWISE THE 6" X 6" X 0.224"Ø STEEL WELDED WIRE MESH CAN BE USED).
16. UNDERDRAIN IS ONLY REQUIRED FOR HYDROMODIFICATION/BIOINFILTRATION COMBINATION BASINS. SEAL UNDERDRAIN PIPE JUNCTION AT RISER WITH SEALANT OR GASKET APPROVED BY OCPW.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved 
Kevin Onuma, County Engineer

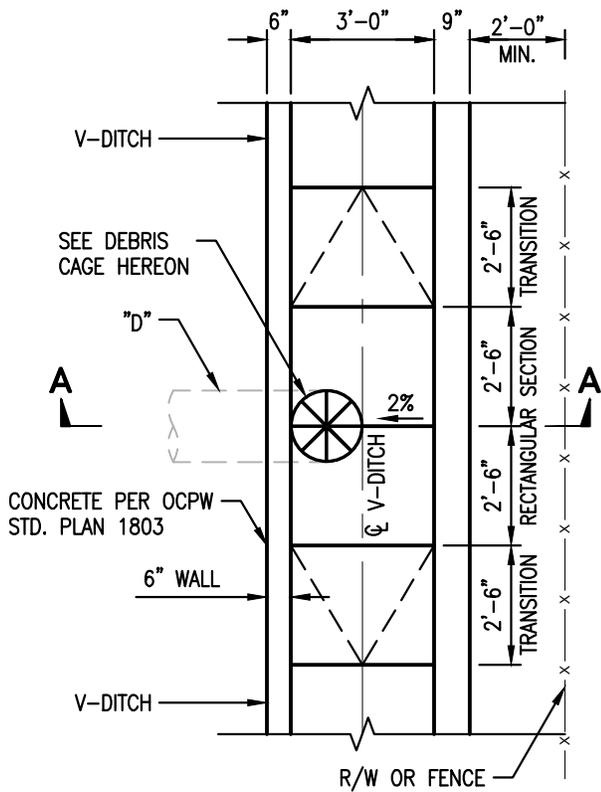
May 2021

HYDROMOD BASIN OVERFLOW METAL STANDPIPE RISER

STD. PLAN

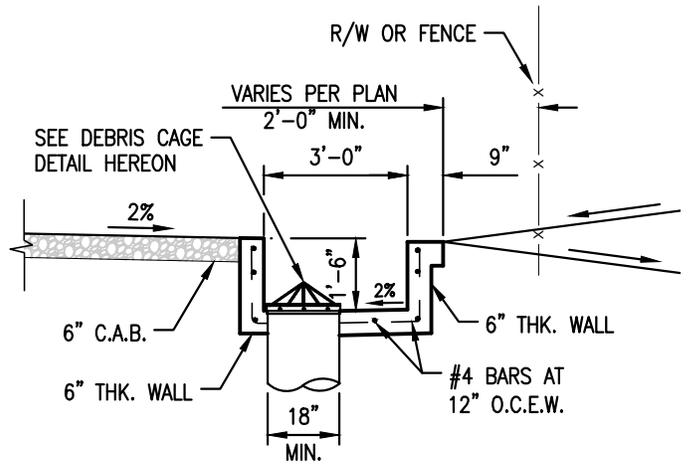
1916

SHT. 4 OF 4



PLAN
CONCRETE LINED INLET

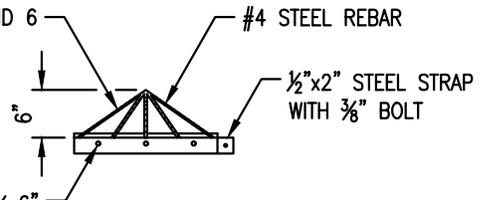
SCALE: 1/4" = 1'-0"



SECTION A-A

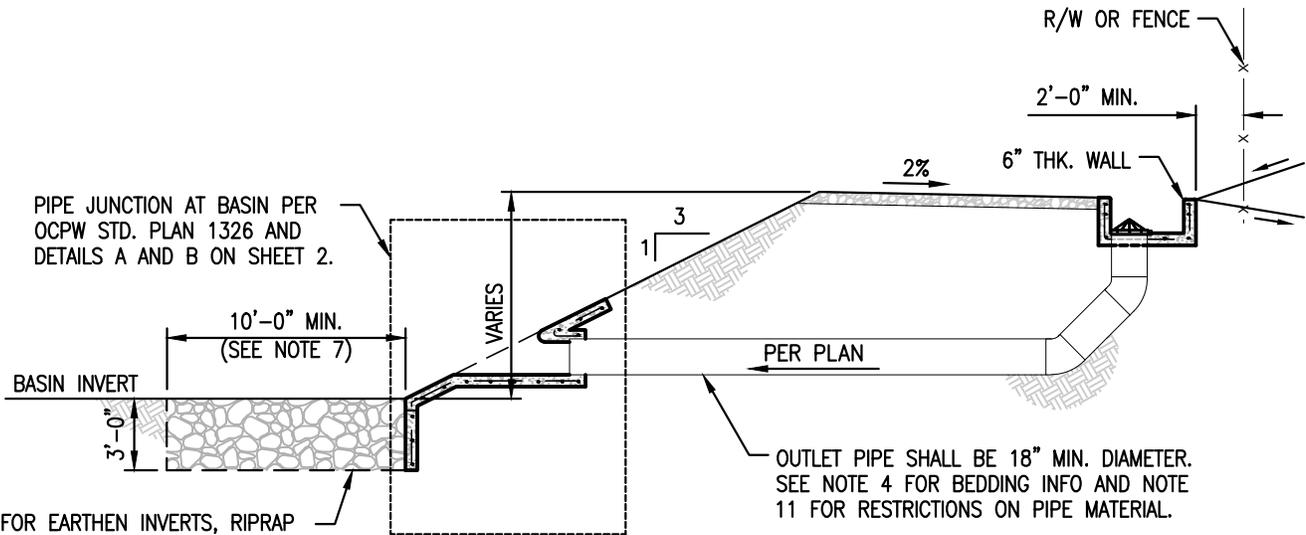
SCALE: 1/4" = 1'-0"

SEE NOTES 5 AND 6 ON SHEET 4



DEBRIS CAGE

SCALE: 1/2" = 1'-0"



PROFILE - PIPE JUNCTION AT BASIN

SCALE: 1/8" = 1'-0"

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved

Kevin Onuma
Kevin Onuma, County Engineer

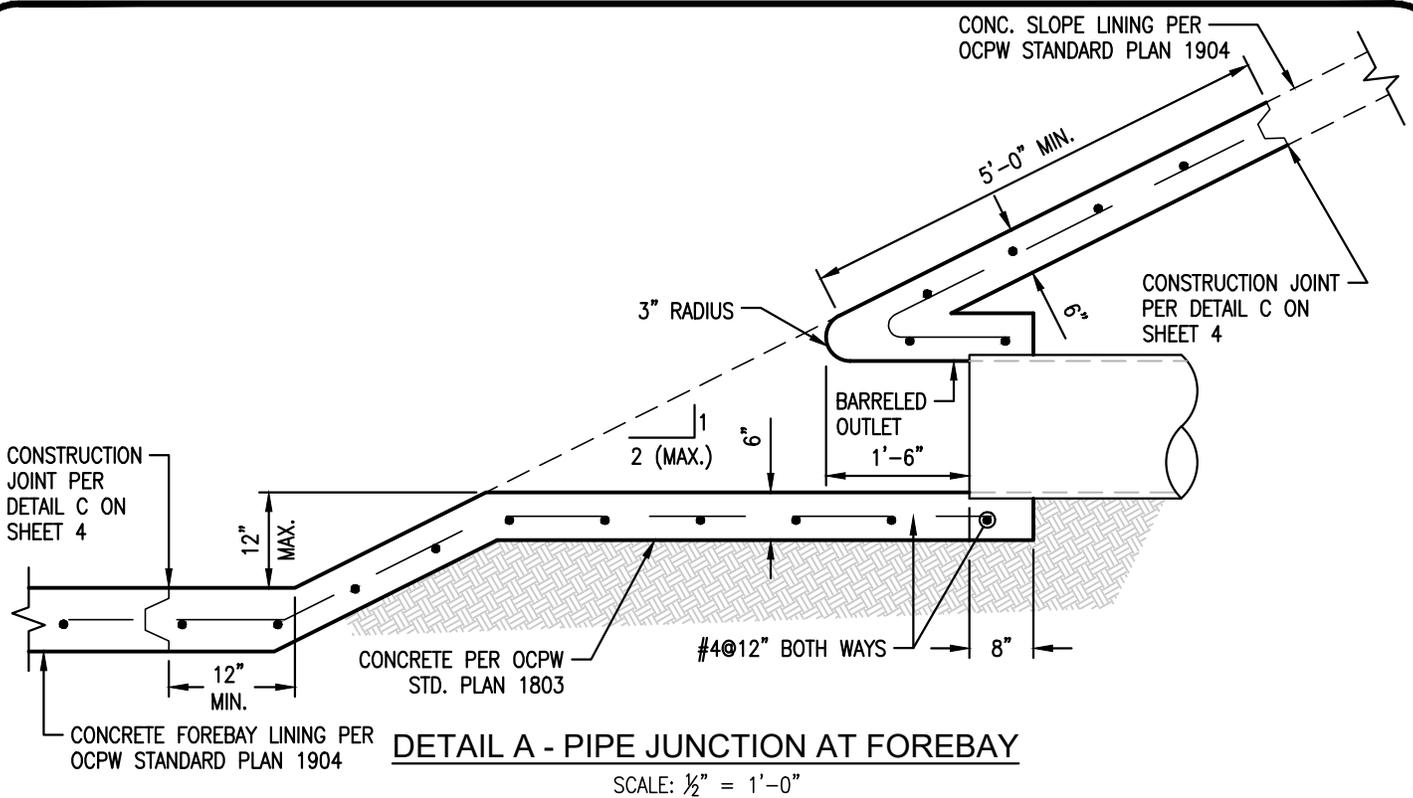
May 2021

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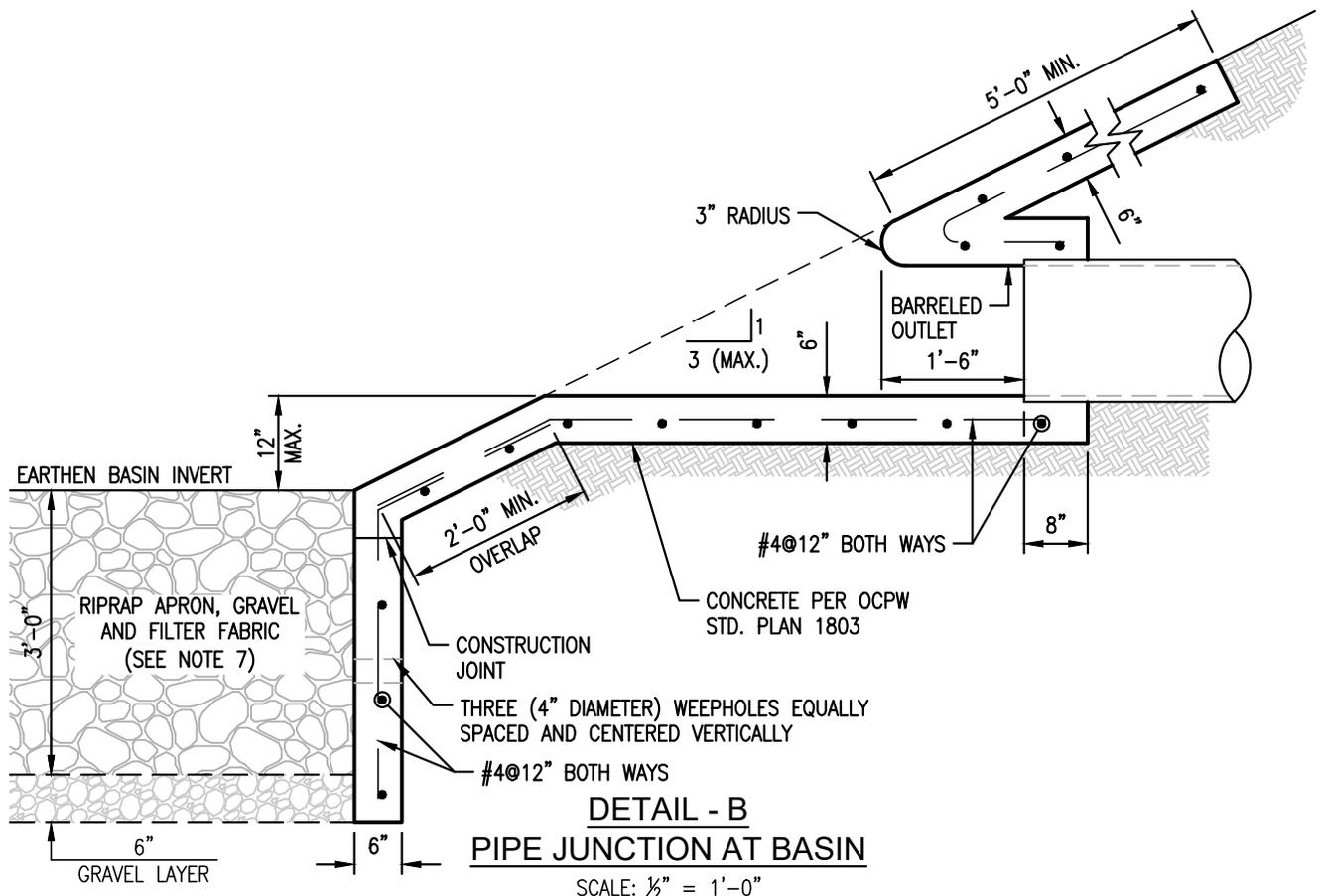
1917

STORM DRAIN PIPE FROM PERIMETER V-DITCH TO BASIN

SHT. 1 OF 4



DETAIL A - PIPE JUNCTION AT FOREBAY
SCALE: 1/2" = 1'-0"



**DETAIL - B
PIPE JUNCTION AT BASIN**
SCALE: 1/2" = 1'-0"

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

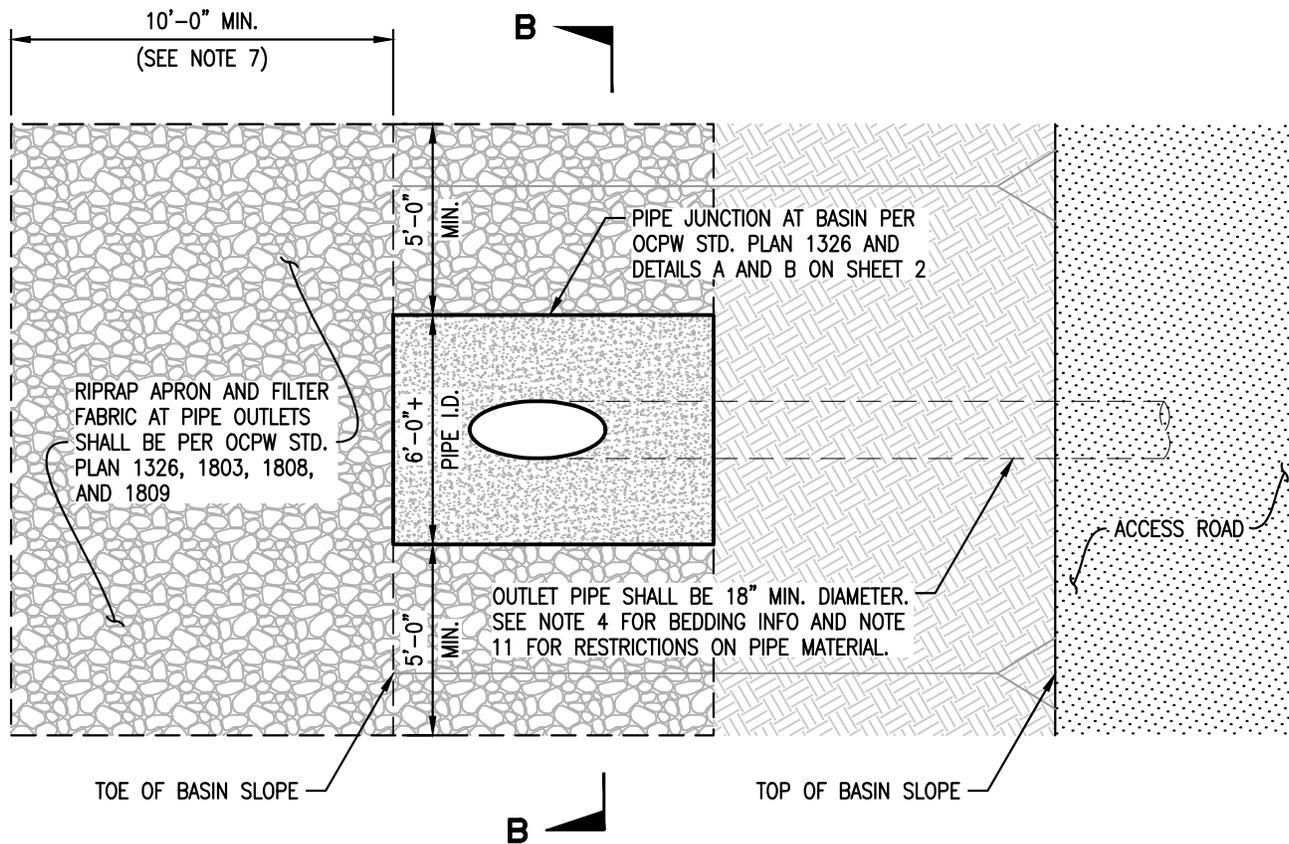
May 2021

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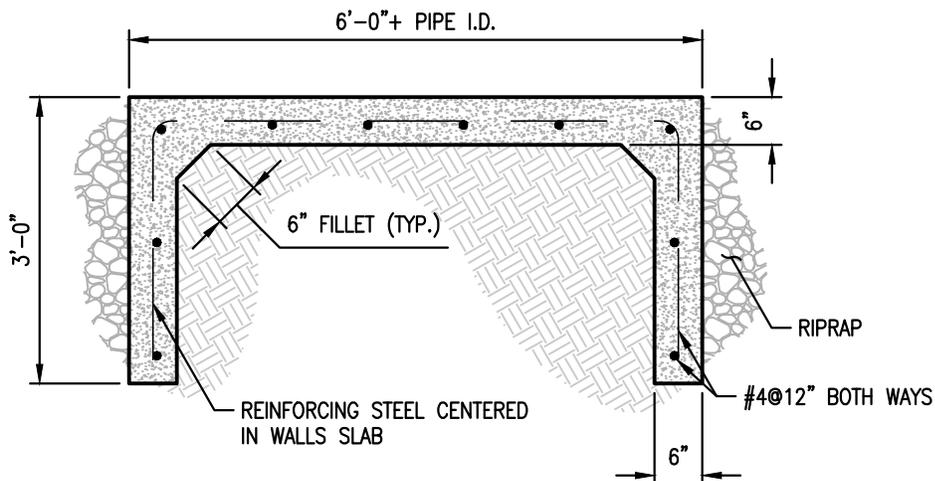
1917

STORM DRAIN PIPE FROM PERIMETER V-DITCH TO BASIN

SHT. 2 OF 4



PLAN - PIPE JUNCTION AT BASIN
N.T.S.



SECTION B-B
N.T.S.

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Approved *Kevin Onuma*
Kevin Onuma, County Engineer

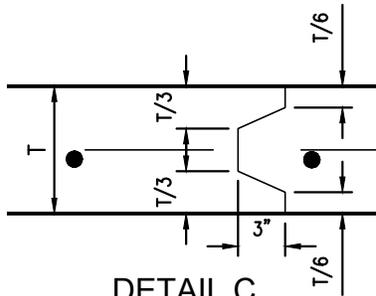
May 2021

STD. PLAN

1917

STORM DRAIN PIPE FROM PERIMETER V-DITCH TO BASIN

SHT. 3 OF 4



DETAIL C
SCALE: 1" = 1'-0"

NOTES:

1. THE DRAINAGE AREA, INCLUDING THE BASIN PERIMETER ROADWAY, CONTRIBUTING RUNOFF TO THE V-DITCH MUST BE DELINEATED AS A DRAINAGE MANAGEMENT AREA (DMA) ACCORDING TO THE APPLICABLE TGD FOR THE PROJECT. IF THE TGD INDICATES THE USE OF A STORMWATER BMP FOR THIS DMA, RUNOFF FROM THE V-DITCH MAY BE DIRECTED INTO THE BASIN, AND THE BASIN MUST THEN BE SIZED APPROPRIATELY FOR THE BMP DESIGN VOLUME AND 100-YEAR Q FROM THE DMA TRIBUTARY TO THE V-DITCH.
2. VERIFY CONCRETE V-DITCH HAS ADEQUATE HYDRAULIC CAPACITY TO CONVEY TOTAL DRAINAGE TO INLET WITHOUT EXCEEDING TOP OF V-DITCH.
3. VERIFY HYDRAULIC CAPACITY OF VERTICAL PIPE INLET OPENING, SIZE WITH ORIFICE OR WEIR EQUATION AT V-DITCH CONNECTION. HEADWATER AT PIPE OPENING CANNOT EXCEED V-DITCH DEPTH.
4. SEE OCPW STD. PLAN 1319 FOR PIPE BEDDING DETAIL.
5. DEBRIS CAGE SHALL BE GALVANIZED AFTER FABRICATION AND PRIOR TO INSTALLATION. GALVANIZATION SHALL BE PERFORMED IN ACCORDANCE WITH GREENBOOK SPECIFICATIONS SECTIONS 210-3.
6. DEBRIS CAGE SHALL BE CONSTRUCTED OF #4 STEEL REBAR WITH A 6" ON CENTER MAXIMUM SPACING AND SHALL BE SECURED TO THE PIPE WITH A 1/2" THK. AND 2" WIDE STEEL STRAP PER OCPW STD. PLAN 1327. STEEL REBAR SHALL BE GRADE 60 PER ASTM A615 AND SHALL BE WELDED WITH A 3/16" WELD ON BOTH SIDES OF ALL JOINTS.
7. TERMINATE TRANSVERSE DIMENSION OF RIPRAP APRON 10- FEET FROM TOE OF SLOPE. IF VELOCITY EXCEEDS 10 FPS, RIPRAP APRON SHALL BE DESIGNED PER US ARMY CORPS OF ENGINEERS (USACE) PUBLICATION NUMBER EM 1110-2-1601, CHAPTER 3. RIPRAP SHALL BE PER OCPW STD. PLAN 1809, GRAVEL SHALL BE PER OCPW STD. PLAN 1803 AND FILTER FABRIC SHALL BE PER OCPW STD. PLAN 1808.
8. CONCRETE SHALL BE PER OCPW STD. PLAN 1803. PROVIDE 2-INCHES MINIMUM STEEL COVER.
9. IF PIPE IS LARGER THAN 27-INCHES, THEN PIPE JUNCTION AT BASIN DESIGN SHALL BE PROVIDED BY THE ENGINEER.
10. FINISH EXPOSED SURFACE OF CONCRETE WITH WOOD FLOAT.
11. PIPE SIZE TO BE DETERMINED BY THE ENGINEER. PIPE SHALL BE RCP FOR FIRE PRONE AREAS. CORRUGATED HDPE PIPE TYPE "S" (SMOOTH INTERIOR) CAN BE USED FOR NON-FIRE PRONE AREAS UPON APPROVAL FROM OCPW.
12. ALL REINFORCING STEEL SHALL BE GRADE 60 PER ASTM A615 AND PER OCPW STANDARD PLAN 1803.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved

Kevin Onuma
Kevin Onuma, County Engineer

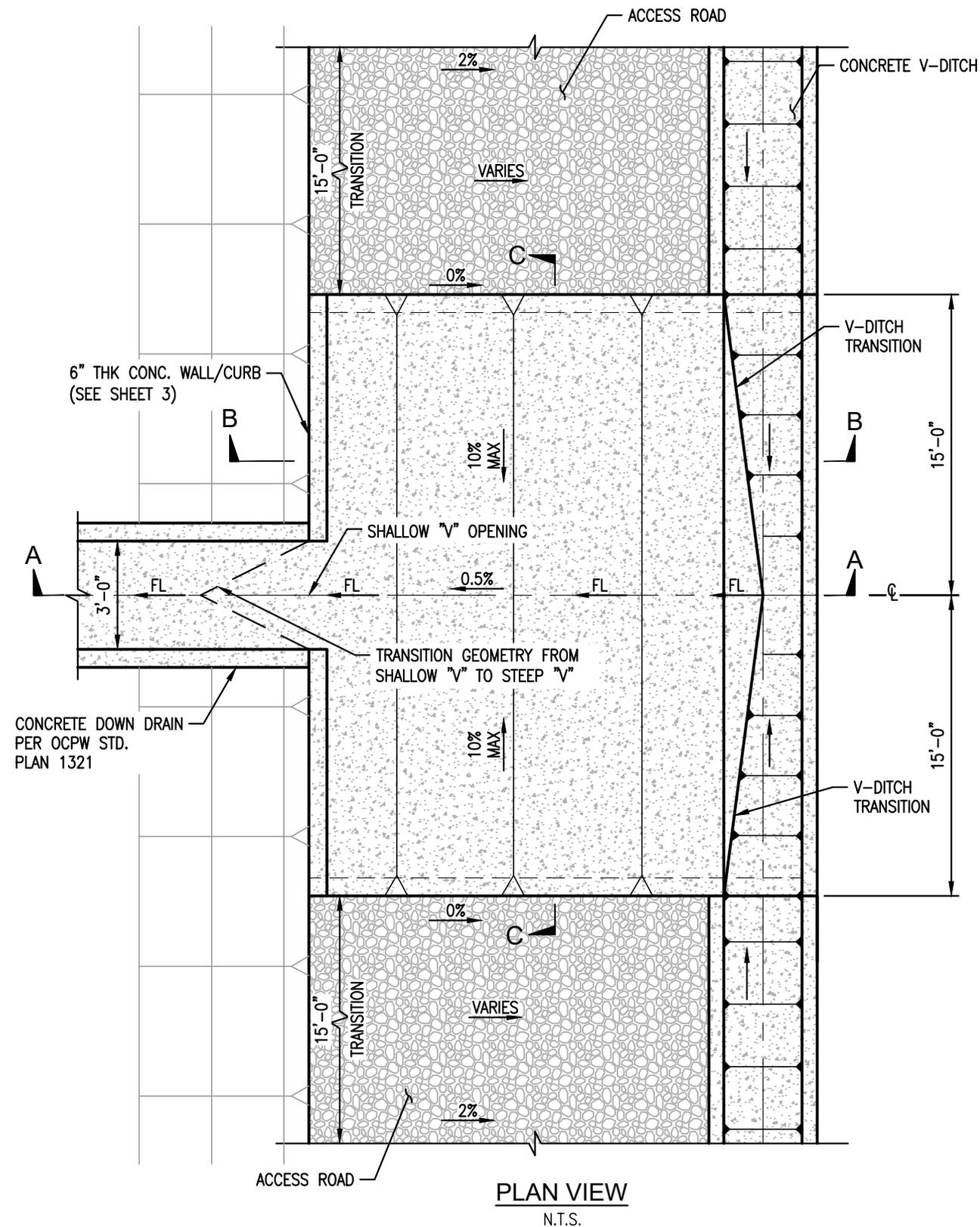
May 2021

STD. PLAN

1917

STORM DRAIN PIPE FROM PERIMETER V-DITCH TO BASIN

SHT. 4 OF 4



PLAN VIEW
N.T.S.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

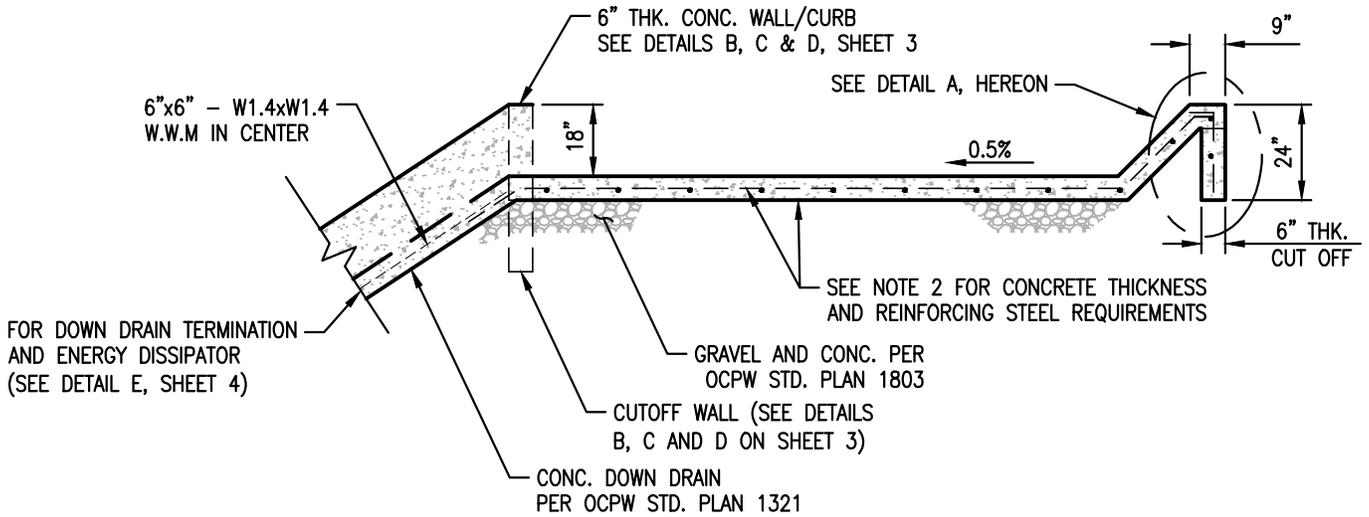
May 2021

STD. PLAN

1918

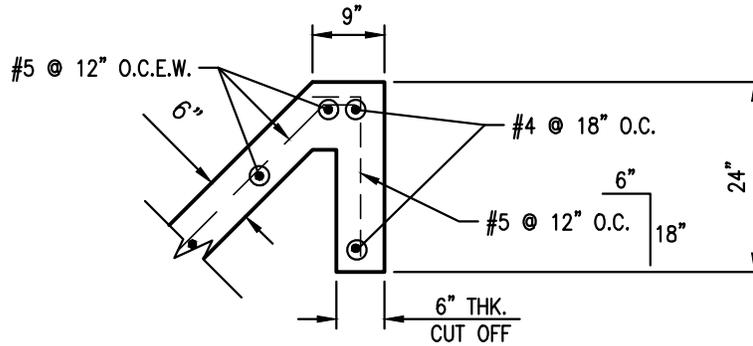
PERIMETER V-DITCH CONCRETE DRAINAGE APRON

SHT. 1 OF 4



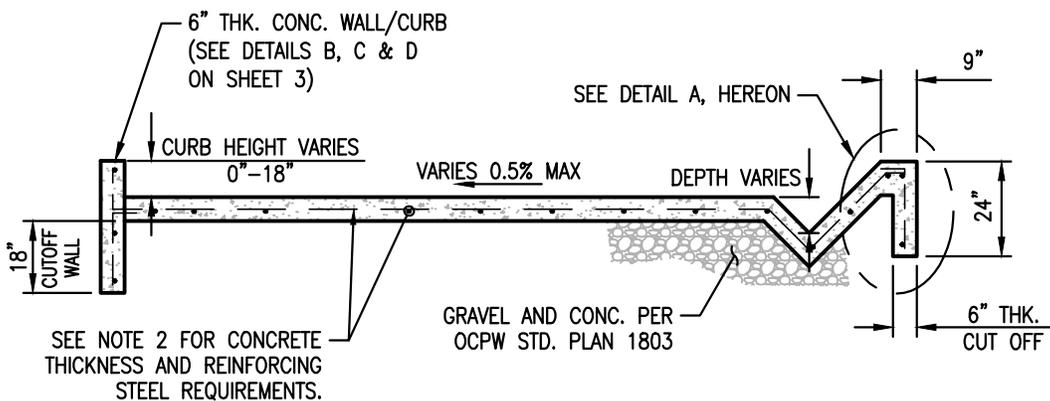
SECTION A-A

SCALE: 1/4" = 1'-0"



DETAIL A

SCALE: 1/2" = 1'-0"



SECTION B-B

SCALE: 1/4" = 1'-0"

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

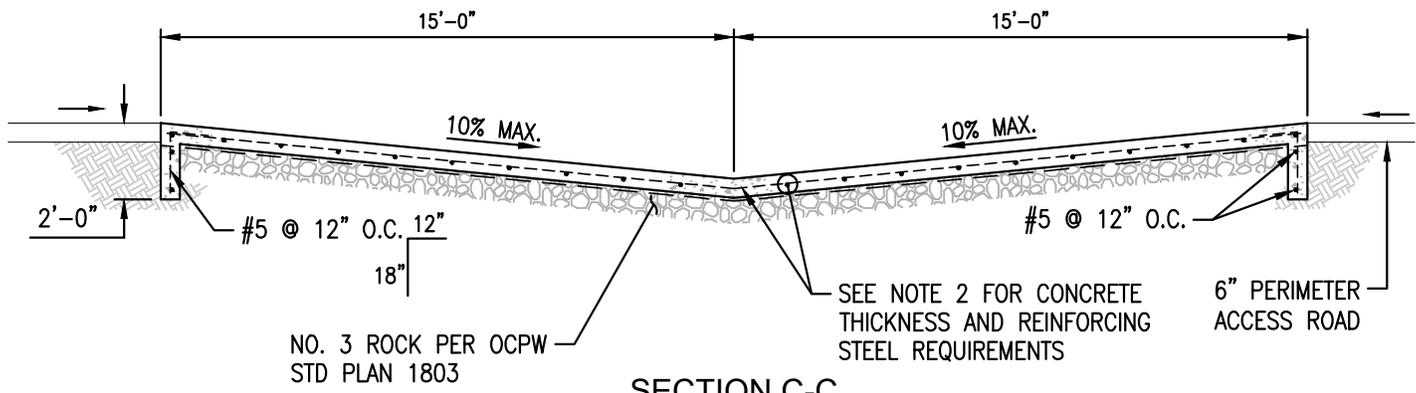
May 2021

STD. PLAN

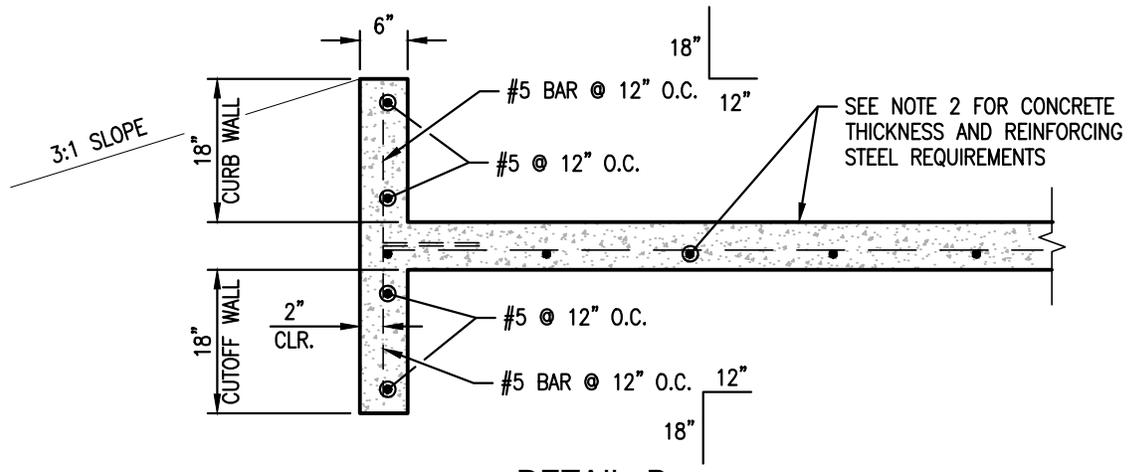
1918

PERIMETER V-DITCH CONCRETE DRAINAGE APRON

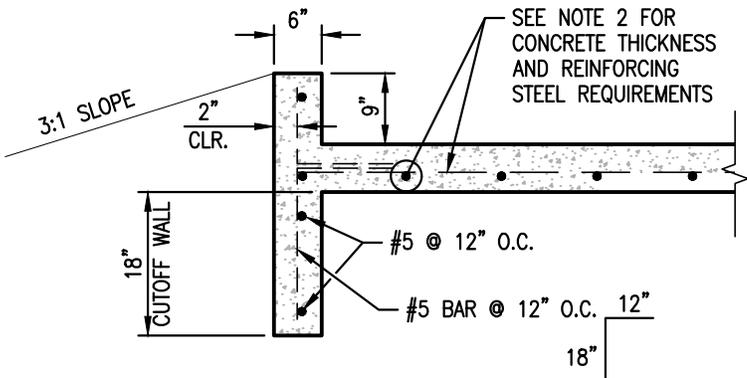
SHT. 2 OF 4



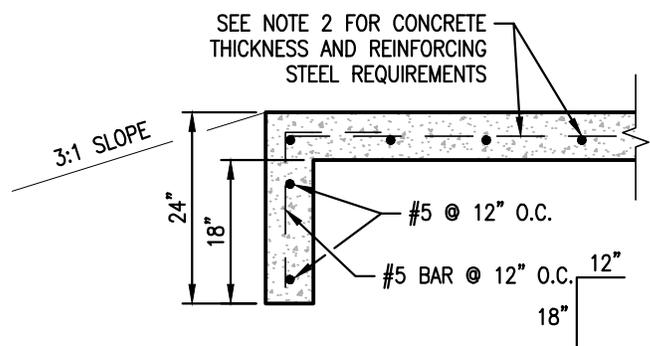
SECTION C-C
N.T.S.



DETAIL B
CURB WALL AT 18" MAX. HEIGHT
(AT END OF WALL)
N.T.S.



DETAIL C
CURB WALL AT MIDDLE 9" HEIGHT
(MID-SPAN OF WALL)
N.T.S.



DETAIL D
CURB WALL AT 0" MIN. HEIGHT
(AT BEGIN WALL LOCATIONS)
N.T.S.

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Approved *Kevin Onuma*
Kevin Onuma, County Engineer

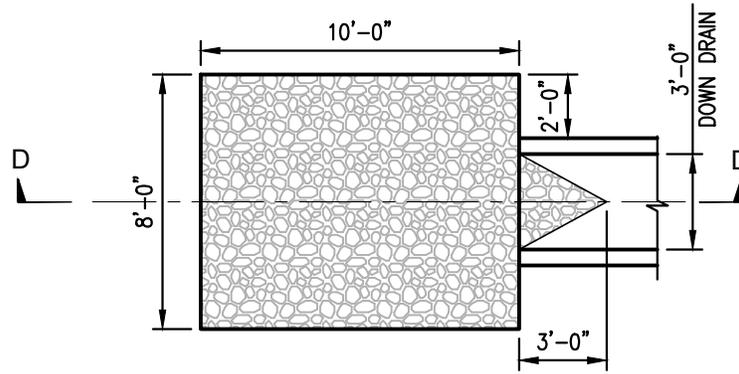
May 2021

STD. PLAN

1918

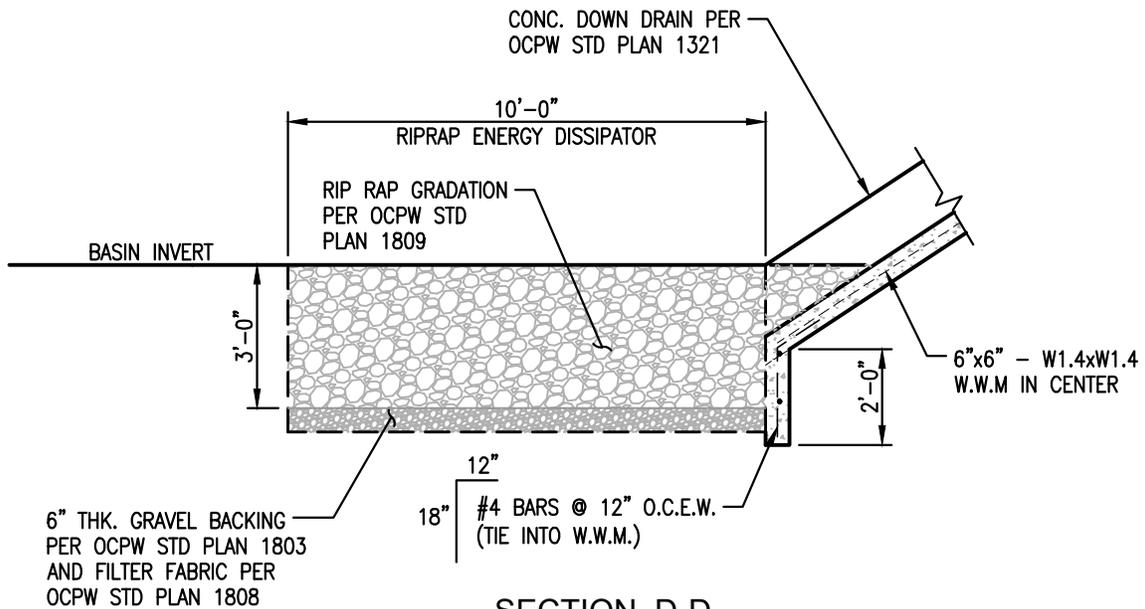
PERIMETER V-DITCH CONCRETE DRAINAGE APRON

SHT. 3 OF 4



DETAIL E

N.T.S.



SECTION D-D

N.T.S.

NOTES:

1. CONCRETE APRON ACROSS MAINTENANCE ACCESS ROADWAYS SHALL BE PROVIDED TO CONVEY DRAINAGE FROM THE V-DITCH TO THE CONCRETE DOWN DRAIN AND INTO THE BASIN. CONCRETE SHALL BE 560-C-3250 PER GREENBOOK SPECIFICATIONS SECTION 201-1.1.2 AND CONFORM WITH OCPW STD. PLAN 1803. CONCRETE SURFACE SHALL HAVE A TRANSVERSE RAKED FINISH.
2. CONCRETE THICKNESS AND REINFORCING STEEL SIZE/SPACING SHALL BE DETERMINED BY DESIGNER BASED ON STRUCTURAL DESIGN REQUIREMENTS FOR HS-20 LOADING PER OCPW. ALL REINFORCING STEEL SHALL BE GRADE 60 IN ACCORDANCE WITH ASTM A615 PER OCPW STD. PLAN 1803.
3. DESIGNER SHALL VERIFY THE HYDRAULIC CONVEYANCE CAPACITY OF THE CONCRETE APRON EXCEEDS FLOW RATE DELIVERED BY V-DITCH. FLOW MUST BE CONTAINED WITHIN THE LIMITS OF THE CONCRETE APRON.
4. CONCRETE APRON HAS A VERTICAL CONCRETE CURB ON THE SIDE ADJACENT TO THE BASIN TO HELP CONTAIN AND DIRECT THE DRAINAGE INTO THE CONCRETE DOWN DRAIN. THE CONCRETE DOWN DRAIN SHALL BEGIN AS A SHALLOW "V" CHANNEL AT THE JUNCTION WITH THE CONCRETE DRAINAGE APRON AND SHALL TRANSITION TO A STEEP "V" TRIANGULAR CHANNEL WITHIN A 3-FT MINIMUM DISTANCE.
5. DESIGNER SHALL VERIFY HYDRAULIC CAPACITY OF THE DOWN DRAIN TRANSITION OPENING AT THE CONCRETE CURB. USE INLET CONTROL OR WEIR FLOW EQUATION TO CONFIRM WIDTH OF OPENING THAT PROVIDES HEADWATER BELOW TOP OF CONCRETE CURB HEIGHT. ADJUST THE WIDTH OF THE OPENING IF ADDITIONAL HYDRAULIC CAPACITY IS REQUIRED.
6. A 8'(W) X 10'(L) RIPRAP APRON SHALL BE CONSTRUCTED AT DOWNSTREAM END OF CONCRETE DOWN DRAIN IF DOWN DRAIN OUTLETS INTO EARTHEN BASIN FOR ENERGY DISSIPATION AND SCOUR PREVENTION.

COUNTY OF ORANGE, OC PUBLIC WORKS DEPARTMENT

Approved *Kevin Onuma*
Kevin Onuma, County Engineer

May 2021

STD. PLAN

1918

PERIMETER V-DITCH CONCRETE DRAINAGE APRON

SHT. 4 OF 4