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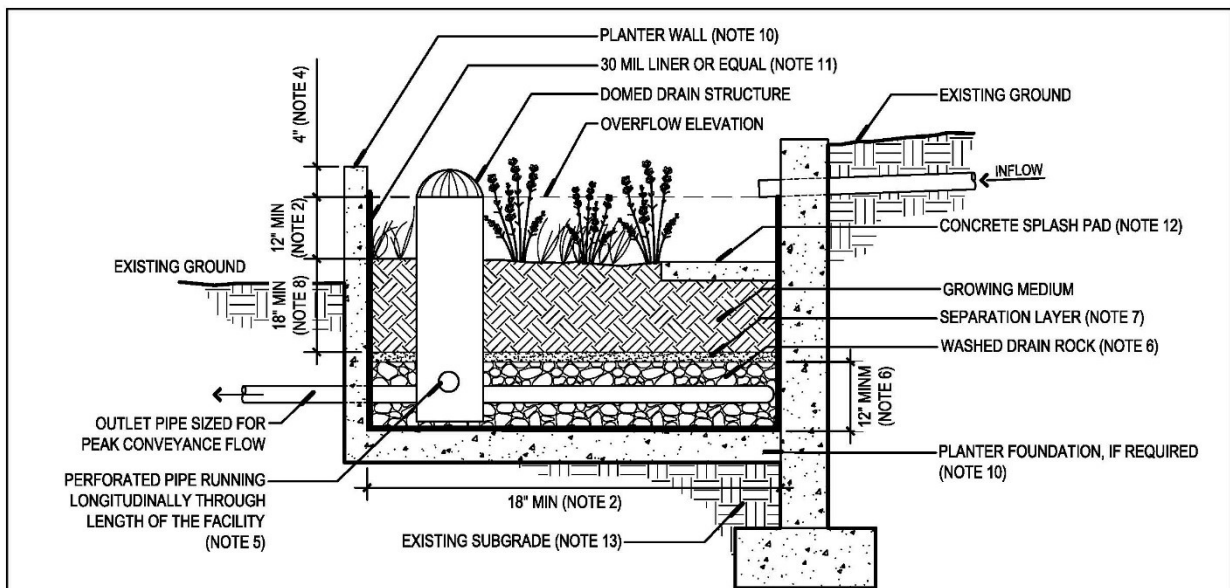
Để yêu cầu dịch vụ dịch thuật hoặc điều chỉnh liên quan đến tình trạng khuyết tật,
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Stormwater Standards


Appendix C: Stormwater Typical Drawings and Standard Details

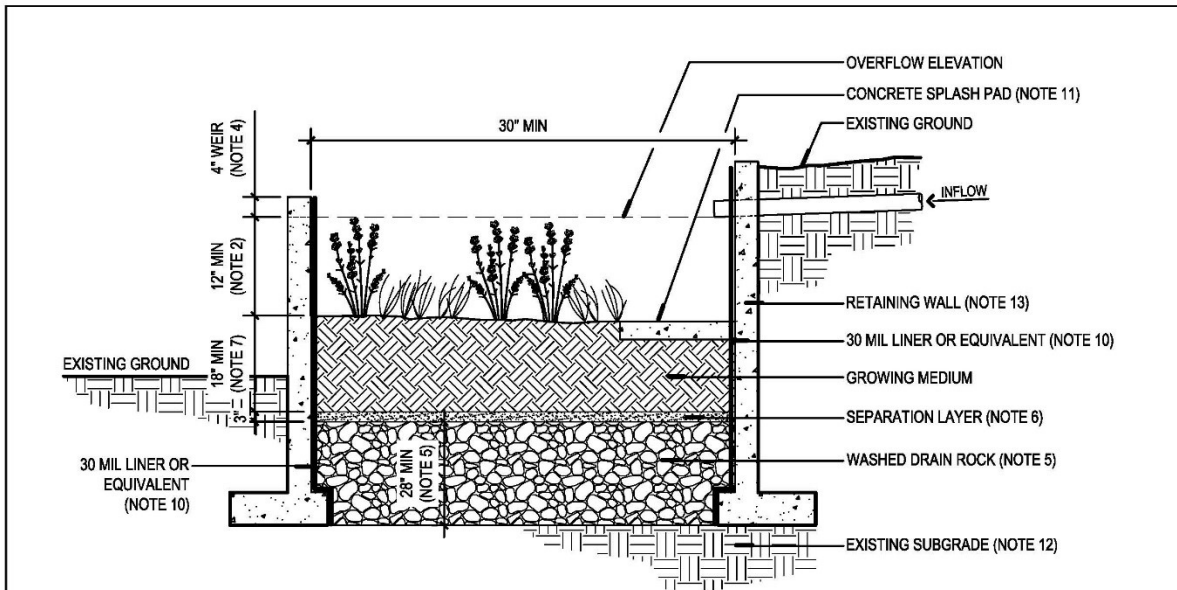
<u>Dwg #</u>	<u>Drawing Description</u>	<u>Dwg #</u>	<u>Drawing Description</u>
<u>BMP SIZING TOOL FACILITY DRAWINGS</u>		<u>STANDARD DETAILS (cont.)</u>	
SWM-01	PLANTER FILTRATION	SWM-24	FLOW STRUCTURE TYPE 3
SWM-02	PLANTER INFILTRATION	SWM-25	MANHOLE BASE
SWM-03	RAIN GARDEN FILTRATION	SWM-26	MH CHANNEL AND RING EXTENSION
SWM-04	RAIN GARDEN INFILTRATION	SWM-27	MH DRYWELL
SWM-05	VEGETATED SWALE FILTRATION	SWM-28	MH ENERGY DISSIPATOR
SWM-06	VEGETATED SWALE INFILTRATION	SWM-29	MH FLEXIBLE CONNECTION
SWM-07	FILTER STRIP	SWM-30	MH FLOW CONTROL
SWM-08	SIMPLIFIED DESIGN APPROACH DRYWELL	SWM-31	MH OVAL GRATE DETAIL
SWM-09	SIMPLIFIED DESIGN APPROACH INFILTRATION TRENCH	SWM-32	MH SHALLOW PRECAST
SWM-10	DETENTION POND	SWM-33	MH STANDARD
SWM-11	DETENTION POND FLOW CONTROL STRUCTURE	SWM-34	MH STEP
SWM-12	PERVIOUS PAVEMENT	SWM-35	MH STANDARD FRAME & COVER
SWM-13	GREEN ROOF	SWM-36	MH SUBURBAN FRAME & COVER
<u>STANDARD DETAILS</u>		SWM-37	ANCHOR WALL
SWM-14	CB CURB AND GUTTER DETAIL	SWM-38	TRENCH RESTORATION
SWM-15	CB CURB INLET	SWM-39	TRENCH RESTORATION WITH CDF
SWM-16	CB DITCH INLET	SWM-40	COLLECTION SYSTEM DIAGRAM
SWM-17	CB FRAME AND GRATE	SWM-41	MH LOCATION DIAGRAM
SWM-18	CB STANDARD GB2	SWM-42	CURB CUT OPENING
SWM-19	DETENTION TANK DIAGRAM	SWM-43	CURB STAMP DETAIL
SWM-20	POND DIAGRAM	SWM-44	INSERTA TEE
SWM-21	SHEAR GATE AND ORIFICE	SWM-45	OUTFALL RIP RAP
SWM-22	FLOW STRUCTURE TYPE 1	SWM-46	OUTFALL RIP RAP SIZING
SWM-23	FLOW STRUCTURE TYPE 2	SWM-47	REMOVABLE BOLLARD
		SWM-48	ROOF DOWNSPOUT SYSTEM
		SWM-49	SERVICE CONNECTION



GENERAL NOTES:


1. **PROVIDE PROTECTION** FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION.
2. **DIMENSIONS:**
 - WIDTH: 18" MINIMUM
 - DEPTH OF PLANTER (FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION): 12"
 - SLOPE OF PLANTER: 0.5% OR LESS
3. **SETBACKS:**
 - PLANTERS MUST BE MINIMUM OF 5 FEET FROM PROPERTY LINE.
4. **OVERFLOW:**
 - INLET ELEVATION MUST ALLOW FOR 4" OF FREEBOARD, MINIMUM.
 - PROTECT FROM DEBRIS AND SEDIMENT WITH STRAINER OR GRATE.
5. **PIPING:**
 - PERFORATED UNDERDRAIN PIPING: SHALL BE ABS SCH. 40, DUCTILE IRON, OR PVC SCH.40, 6" MINIMUM DIAMETER. PIPING MUST HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
 - OVERFLOW PIPING: SHALL BE ABS SCH.40, DUCTILE IRON, OR PVC SCH.40 AND SHALL NOT BE PERFORATED. MINIMUM DIAMETER IS 6". PIPING MUST HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
6. **DRAIN ROCK:**
 - SIZE FOR FLOW-THROUGH PLANTER: 1 1/2" - 3/4" WASHED
 - DEPTH: 12" MINIMUM
7. **SEPARATION BETWEEN DRAIN ROCK AND GROWING MEDIUM:** SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
8. **GROWING MEDIUM:**
 - DEPTH: 18" MINIMUM
 - FACILITY SURFACE AREA MAY BE REDUCED BY 20% WHEN GROWING MEDIA DEPTH IS INCREASED TO 30" OR MORE.
9. **VEGETATION:** FOLLOW LANDSCAPE PLANS OR REFER TO PLANTING REQUIREMENTS IN APPENDIX F.
10. **PLANTER FOUNDATION AND WALLS:**
 - MATERIALS SHALL BE 4" REINFORCED CONCRETE, STONE, BRICK, OR OTHER DURABLE MATERIAL.
 - CONCRETE, BRICK, OR STONE WALLS SHALL BE INCLUDED ON FOUNDATION PLANS.
 - INSTALL INVERTED CURB AS NEEDED BETWEEN PLANTER AND ROAD SUBGRADE.
 - WALL HEIGHTS GREATER THAN 24" ABOVE GRADE REQUIRE HANDRAIL.
11. **WATERPROOF LINER (IF REQUIRED):**
 - LINER SHALL BE 30 MIL PVC OR EQUIVALENT, FOR FLOW THROUGH FACILITIES.
 - A WATERPROOF LINER IS NOT REQUIRED IF THE FOUNDATION OR WALL MATERIAL IS WATERPROOF REINFORCED CONCRETE OR APPROVED EQUAL.
12. **INSTALL CONCRETE SPLASH PAD** TO TRANSITION FROM INLET TO GROWING MEDIUM. SIZE OF PAD SHALL BE 1 FT. x 1 FT.
13. **SEASONAL HIGH GROUNDWATER SEPARATION:**
 - SEPARATION DISTANCE AS REQUIRED BY THE WES.
14. **SUBMIT RETAINING WALL DESIGN** IN ACCORDANCE WITH APPLICABLE STRUCTURAL CODES FOR REVIEW AND APPROVAL.
15. **SEE WES STANDARD DRAWINGS** FOR LOCATING PLANTERS IN THE PUBLIC RIGHT-OF-WAY.

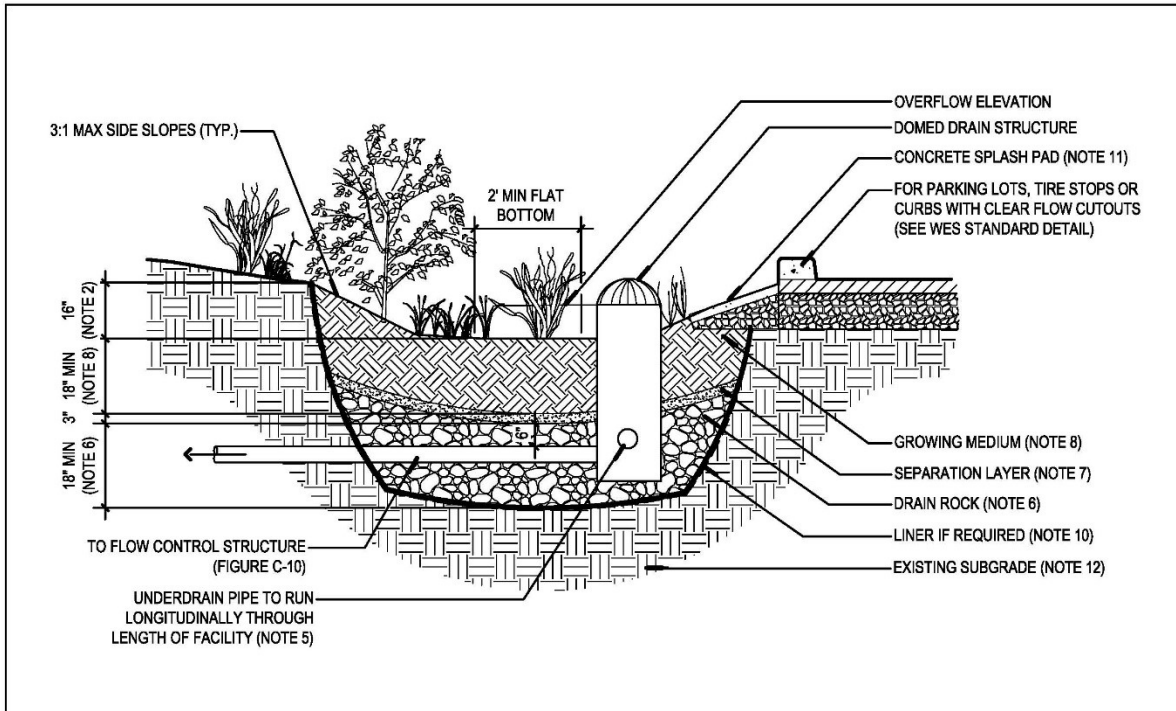
	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING SWM -01
		PLANTER FILTRATION	



GENERAL NOTES:


1. **PROVIDE PROTECTION** FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION.
2. **DIMENSIONS:**
 - WIDTH: 30" MINIMUM
 - DEPTH OF PLANTER (FROM TOP OF GROWING MEDIUM TO OVERFLOW WEIR ELEVATION): 12"
 - SLOPE OF PLANTER: 0.5% OR LESS
3. **SETBACKS:**
 - PLANTERS MUST BE MINIMUM OF 5 FEET FROM PROPERTY LINE.
4. **OVERFLOW:**
 - WEIR ELEVATION MUST ALLOW FOR 4" OF FREEBOARD, MINIMUM.
 - SIZE OVERFLOW WEIR FOR THE 100 YEAR DESIGN STORM. IDENTIFY EMERGENCY OVERFLOW ROUTE ON THE STORMWATER MANAGEMENT PLAN.
5. **DRAIN ROCK:**
 - SIZE: 1 1/2" - 3/4" WASHED
 - DEPTH: 28" MINIMUM
6. **SEPARATION BETWEEN DRAIN ROCK AND GROWING MEDIUM:** SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
7. **GROWING MEDIUM:**
 - DEPTH: 18" MINIMUM
 - FACILITY SURFACE AREA MAY BE REDUCED BY 20% WHEN GROWING MEDIA DEPTH IS INCREASED TO 30" OR MORE.
8. **VEGETATION:** FOLLOW LANDSCAPE PLANS OR REFER TO PLANTING REQUIREMENTS IN APPENDIX F.
9. **PLANTER WALLS:**
 - MATERIALS SHALL BE STONE, BRICK, CONCRETE OR OTHER DURABLE MATERIAL.
 - CONCRETE, BRICK, OR STONE WALLS SHALL BE INCLUDED ON FOUNDATION PLANS.
 - INSTALL INVERTED CURB AS NEEDED BETWEEN PLANTERS AND ROAD SUBGRADE.
 - WALL HEIGHTS GREATER THAN 24" ABOVE GRADE REQUIRE HANDRAIL.
10. **WATERPROOF LINER:**
 - LINER SHALL BE 30 MIL PVC OR EQUIVALENT.
 - A WATERPROOF LINER IS NOT REQUIRED IF THE WALL MATERIAL IS WATERPROOF REINFORCED CONCRETE OR APPROVED EQUAL.
11. **INSTALL CONCRETE SPLASH PAD** TO TRANSITION FROM INLET TO GROWING MEDIUM. SIZE OF PAD SHALL BE 1 FT. x 1 FT.
12. **SEASONAL HIGH GROUNDWATER SEPARATION:**
 - SEPARATION DISTANCE AS REQUIRED BY WES.
13. **SUBMIT RETAINING WALL DESIGN** IN ACCORDANCE WITH APPLICABLE STRUCTURAL CODES FOR REVIEW AND APPROVAL.
14. **SEE WES STANDARD DRAWINGS** FOR LOCATING PLANTERS IN THE PUBLIC RIGHT-OF-WAY.

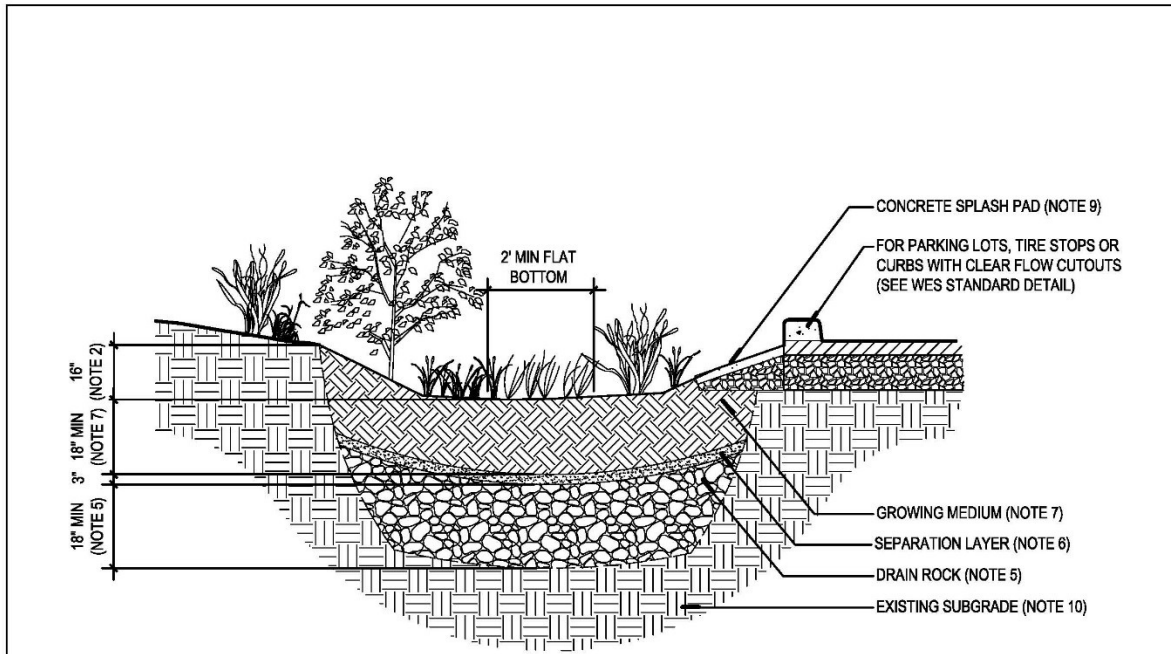
	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING SWM -02
		PLANTER INFILTRATION	



GENERAL NOTES:


1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION. UNLESS REQUIRED BY SITE CONDITIONS, UNLINED RAIN GARDENS ARE PREFERRED TO MAXIMIZE ONSITE INFILTRATION.
2. DIMENSIONS:
 - DEPTH OF BASIN (FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION): 12"
 - FLAT BOTTOM WIDTH: 2' MINIMUM
 - SIDE SLOPES OF BASIN: 3:1 MAXIMUM
 - SLOPE OF RAIN GARDEN: 0.5% OR LESS
3. SETBACKS:
 - FILTRATION RAIN GARDEN MUST BE 10' FROM FOUNDATIONS AND 5' FROM PROPERTY LINES UNLESS APPROVED BY BUILDING OFFICIAL.
4. OVERFLOW:
 - OVERFLOW REQUIRED. INLET ELEVATION MUST ALLOW FOR 4" OF FREEBOARD, MINIMUM.
 - PROTECT FROM DEBRIS AND SEDIMENT WITH STRAINER OR GRATE.
5. PIPING:
 - PERFORATED UNDERDRAIN PIPING: SHALL BE ABS SCH. 40, DUCTILE IRON, OR PVC SCH.40. MINIMUM DIAMETER IS 6". PIPING MUST HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
 - OVERFLOW PIPING: SHALL BE ABS SCH. 40, DUCTILE IRON, OR PVC SCH. 40 AND SHALL NOT BE PERFORATED. MINIMUM DIAMETER IS 6". PIPING MUST HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
6. DRAIN ROCK:
 - SIZE: 1 1/2" to 3/4"-0 WASHED
 - DEPTH: 18" MINIMUM
7. SEPARATION BETWEEN DRAIN ROCK AND GROWING MEDIUM: SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
8. GROWING MEDIUM:
 - DEPTH: 18" MINIMUM
 - FACILITY SURFACE AREA MAY BE REDUCED BY 20% WHEN GROWING MEDIA DEPTH IS INCREASED TO 30" OR MORE.
9. VEGETATION: FOLLOW LANDSCAPE PLANS OR REFER TO PLANTING REQUIREMENTS IN APPENDIX A.
10. WATERPROOF LINER (IF REQUIRED): SHALL BE 30 MIL PVC OR EQUIVALENT.
11. SPLASH PAD TO TRANSITION FROM INLETS TO GROWING MEDIUM.
12. SEASONAL HIGH GROUNDWATER SEPARATION:
 - SEPARATION DISTANCE AS REQUIRED BY WES.
13. SEE WES STANDARD DRAWINGS FOR LOCATING PLANTERS IN THE PUBLIC RIGHT-OF-WAY.

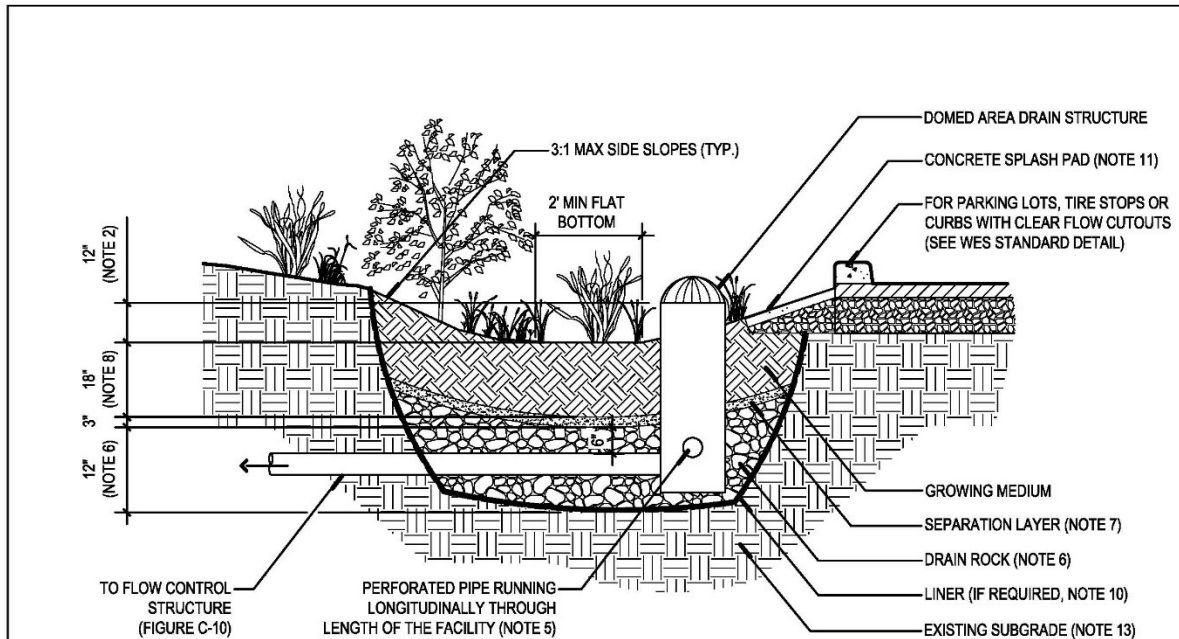
	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING
		RAIN GARDEN FILTRATION	SWM -03



GENERAL NOTES:


1. **PROVIDE PROTECTION** FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION.
2. **DIMENSIONS:**
 - DEPTH OF BASIN (FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION): 16"
 - FLAT BOTTOM WIDTH: 2' MINIMUM
 - SIDE SLOPES OF BASIN: 3:1 MAXIMUM
 - SLOPE OF RAIN GARDEN: 0.5% OR LESS
3. **SETBACKS:**
 - INFILTRATION RAIN GARDEN MUST BE 10' FROM FOUNDATIONS AND 5' FROM PROPERTY LINES.
4. **OVERFLOW:**
 - EMERGENCY OVERFLOW PATH FOR THE 100 YEAR DESIGN STORM SHALL BE IDENTIFIED IN THE STORMWATER MANAGEMENT PLAN.
5. **DRAIN ROCK:**
 - SIZE: 1 1/2" TO 3/4" - WASHED
 - DEPTH: 18"
6. **SEPARATION** BETWEEN DRAIN ROCK AND GROWING MEDIUM: SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
7. **GROWING MEDIUM:**
 - DEPTH: 18" MINIMUM
 - FACILITY SURFACE AREA MAY BE REDUCED BY 20% WHEN GROWING MEDIA DEPTH IS INCREASED TO 30" OR MORE.
8. **VEGETATION:** FOLLOW LANDSCAPE PLANS OR REFER TO PLANTING REQUIREMENTS IN APPENDIX A.
9. **SPLASH PAD** TO TRANSITION FROM INLETS TO GROWING MEDIUM.
10. **SEASONAL HIGH GROUNDWATER SEPARATION:**
 - SEPARATION DISTANCE AS REQUIRED BY WES.
11. **SEE WES STANDARD DRAWINGS** FOR LOCATING RAIN GARDENS IN THE PUBLIC RIGHT-OF-WAY.

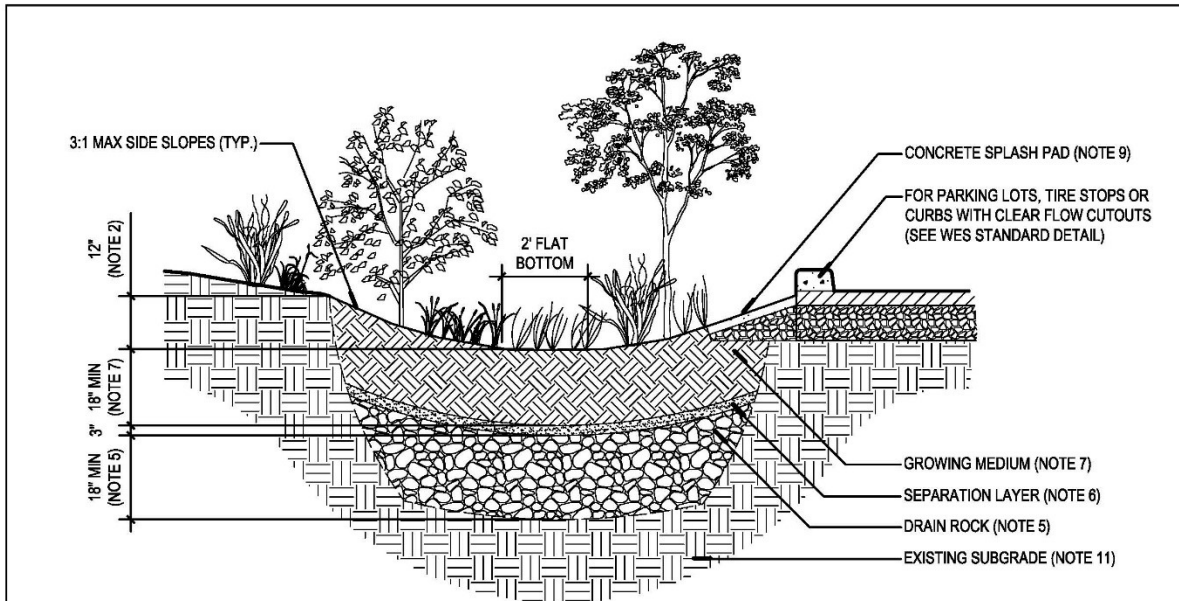
	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING SWM -04
		RAIN GARDEN INFILTRATION	



GENERAL NOTES:


1. **PROVIDE PROTECTION** FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION. UNLESS REQUIRED BY SITE CONDITIONS, UNLINED SWALES ARE PREFERRED TO ALLOW MAXIMUM INFILTRATION.
2. **DIMENSIONS:**
 - DEPTH OF SWALE (FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION): 12"
 - LONGITUDINAL SLOPE OF SWALE: 6.0% OR LESS. INSTALL CHECK DAM IF OVER 4.0%. SEE NOTE 12.
 - FLAT BOTTOM WIDTH: 2' MINIMUM
 - SIDE SLOPES OF SWALE: 3:1 MAXIMUM
3. **SETBACKS:**
 - FILTRATION SWALES MUST BE 10' FROM FOUNDATIONS AND 5' FROM PROPERTY LINES UNLESS APPROVED BY BUILDING OFFICIAL.
4. **OVERFLOW:**
 - INLET ELEVATION MUST ALLOW FOR 4" OF FREEBOARD, MINIMUM.
 - PROTECT FROM DEBRIS AND SEDIMENT WITH STRAINER OR GRATE.
5. **PIPING:**
 - PERFORATED UNDERDRAIN PIPING: SHALL BE ABS SCH. 40, DUCTILE IRON, OR PVC SCH.40. MINIMUM DIAMETER IS 6". PIPING MUST HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
 - OVERFLOW PIPING: SHALL BE ABS SCH. 40, DUCTILE IRON, OR PVC SCH. 40 AND SHALL NOT BE PERFORATED. MINIMUM DIAMETER IS 6". PIPING MUST HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
6. **DRAIN ROCK:**
 - SIZE: 1 1/2" - 3/4" WASHED
 - DEPTH: 12"
7. **SEPARATION** BETWEEN DRAIN ROCK AND GROWING MEDIUM: SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
8. **GROWING MEDIUM:**
 - 18" MINIMUM
 - FACILITY SURFACE AREA MAY BE REDUCED BY 20% WHEN GROWING MEDIA DEPTH IS INCREASED TO 30" OR MORE.
9. **VEGETATION:** FOLLOW LANDSCAPE PLANS OR REFER TO PLANTING REQUIREMENTS IN APPENDIX F.
10. **WATERPROOF LINER (IF REQUIRED):** SHALL BE 30 MIL PVC OR EQUIVALENT.
11. **SPLASH PAD** TO TRANSITION FROM INLETS TO GROWING MEDIUM.
12. **CHECK DAMS:** SHALL BE REQUIRED FOR OVER 4% SLOPE, SHALL BE SPACED AT A MAXIMUM 2-FOOT ELEVATION INTERVALS. MAINTAIN 4 - 10 INCH DEEP ROCK CHECK DAMS AT DESIGN INTERVALS.
13. **SEASONAL HIGH GROUNDWATER SEPARATION:**
 - SEPARATION DISTANCE AS REQUIRED BY WES.
14. **SEE WES STANDARD DRAWINGS** FOR LOCATING SWALES IN THE PUBLIC RIGHT-OF-WAY

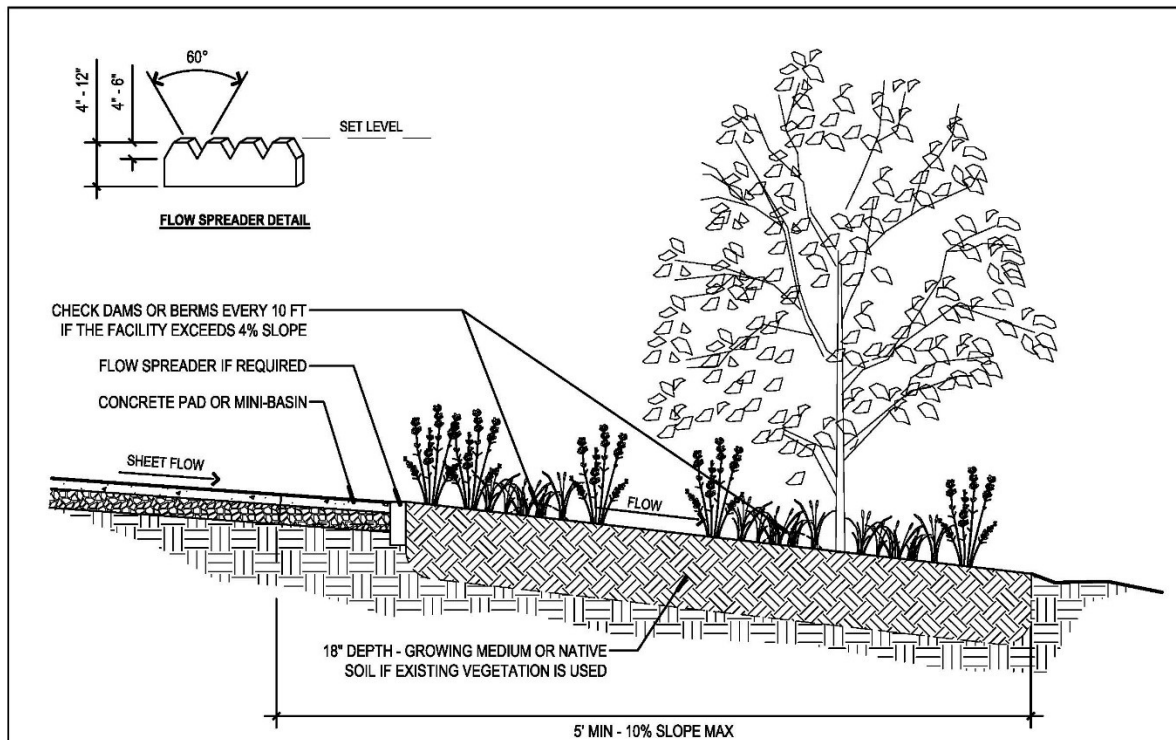
	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING SWM -05
		VEGETATED SWALE FILTRATION	



GENERAL NOTES:


1. **PROVIDE PROTECTION** FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION.
2. **DIMENSIONS:**
 - DEPTH OF SWALE (FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION): 12"
 - LONGITUDINAL SLOPE OF SWALE: 6.0% OR LESS
 - FLAT BOTTOM WIDTH: 2'
 - SIDE SLOPES OF SWALE: 3:1 MAXIMUM
3. **SETBACKS:**
 - INFILTRATION VEGETATED SWALES MUST BE 10' FROM FOUNDATIONS AND 5' FROM PROPERTY LINES.
4. **OVERFLOW:**
 - EMERGENCY OVERFLOW PATH FOR THE 100 YEAR DESIGN STORM SHALL BE IDENTIFIED ON THE STORMWATER MANAGEMENT PLAN.
5. **DRAIN ROCK:**
 - SIZE: 1 1/2" - 3/4" - WASHED
 - DEPTH: 18"
6. **SEPARATION BETWEEN DRAIN ROCK AND GROWING MEDIUM:** SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
7. **GROWING MEDIUM:**
 - 18" MINIMUM
 - FACILITY SURFACE AREA MAY BE REDUCED BY 20% WHEN GROWING MEDIA DEPTH IS INCREASED TO 30" OR MORE.
8. **VEGETATION:** FOLLOW LANDSCAPE PLANS OR REFER TO PLANTING REQUIREMENTS IN APPENDIX F.
9. **SPLASH PAD** TO TRANSITION FROM INLETS TO GROWING MEDIUM.
10. **CHECK DAMS:** REQUIRED FOR OVER 4% SLOPE, SHALL BE SPACED AT A MAXIMUM 2-FOOT ELEVATION INTERVALS. MAINTAIN 4 - 10 INCH DEEP ROCK CHECK DAMS AT DESIGN INTERVALS.
11. **SEASONAL HIGH GROUNDWATER SEPARATION:**
 - SEPARATION DISTANCE AS REQUIRED BY WES.
12. **SEE WES STANDARD DRAWINGS** FOR LOCATING PLANTERS IN THE PUBLIC RIGHT-OF-WAY.

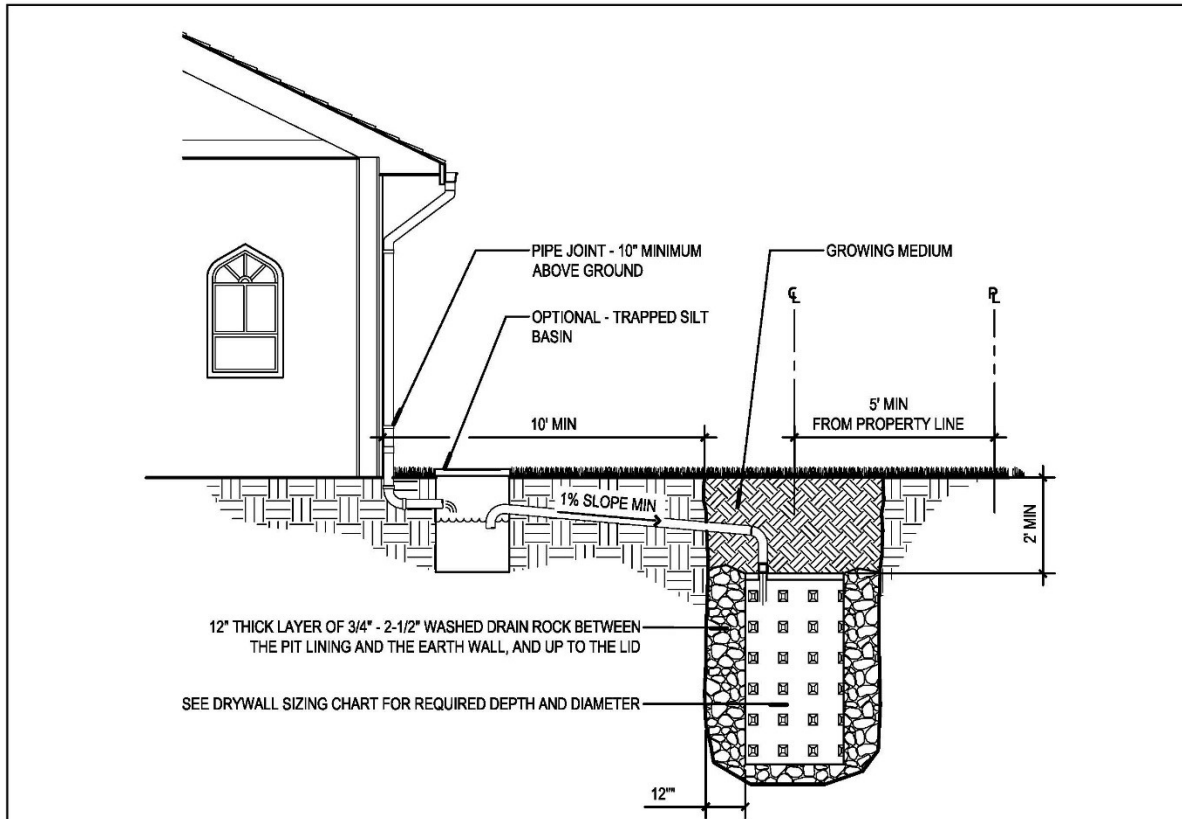
	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING SWM -06
		VEGETATED SWALE INFILTRATION	



GENERAL NOTES:

1. **PROVIDE PROTECTION** FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION.
2. **DIMENSIONS:**
 - LENGTH: 5' MINIMUM
 - SLOPE OF PLANTER: 0.5% -10%
3. **SETBACKS:**
 - FILTER STRIP MUST BE MINIMUM OF 5 FEET FROM PROPERTY LINE, 10 FT FROM BUILDINGS, 50 FT FROM WETLANDS, RIVERS, STREAMS, AND CREEKS.
4. **OVERFLOW:**
 - COLLECTION AND CONVEYANCE TO APPROVED DISCHARGE POINT MAY BE REQUIRED DEPENDING ON DESIGN.
 - WHERE REQUIRED, COLLECTION FROM FILTER STRIP SHALL BE SPECIFIED ON PLANS TO APPROVED DISCHARGE POINT ACCORDING TO WES STANDARDS.
5. **GROWING MEDIUM:**
 - UNLESS EXISTING VEGETATED AREAS ARE USED FOR THE FILTER STRIP, GROWING MEDIUM SHALL BE USED WITHIN THE TOP 18".
 - USE SAND/LOAM/COMPOST 3-WAY MIX OR APPROVED MIX THAT WILL SUPPORT HEALTHY PLANTS.
6. **VEGETATION:**
 - THE ENTIRE FILTER STRIP MUST HAVE 100% COVERAGE BY NATIVE GRASSES, NATIVE WILDFLOWER BLENDS, NATIVE GROUND COVERS, OR ANY COMBINATION THEREOF.
12. **FLOW SPREADERS:** A GRADE BOARD OR SAND/GRAVEL TRENCH MAY BE REQUIRED TO DISPERSE THE RUNOFF EVENLY ACROSS THE FILTER STRIP TO PREVENT A POINT OF DISCHARGE. THE TOP OF THE LEVEL SPREADER MUST BE HORIZONTAL AND AT AN APPROPRIATE HEIGHT TO PROVIDE SHEETFLOW DIRECTLY TO THE SOIL WITHOUT SCOUR. LEVEL SPREADERS SHALL NOT HOLD A PERMANENT VOLUME OF RUNOFF. GRADE BOARDS CAN BE MADE OF ANY MATERIAL THAT WILL WITHSTAND WEATHER AND SOLAR DEGRADATION. TRENCHES USED AS LEVEL SPREADERS CAN BE FILLED WITH WASHED CRUSHED ROCK, PEA GRAVEL, OR SAND.
13. **CHECK DAMS:** REQUIRED FOR OVER 4% SLOPE, SHALL BE SPACED AT A MAXIMUM 2-FOOT ELEVATION INTERVALS. MAINTAIN 4 TO 10 INCH DEEP ROCK CHECK DAMS AT DESIGN INTERVALS.

	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING
		FILTER STRIP	SWM -07



12" THICK LAYER OF 3/4" - 2-1/2" WASHED DRAIN ROCK BETWEEN THE PIT LINING AND THE EARTH WALL, AND UP TO THE LID
SEE DRYWELL SIZING CHART FOR REQUIRED DEPTH AND DIAMETER

GENERAL NOTES:

1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION.
2. **SITING CRITERIA:** GRAVELLY SAND, GRAVELLY LOAMY SAND OR OTHER EQUALLY POROUS MATERIAL MUST OCCUR IN A CONTINUOUS 5' DEEP STRATUM WITHIN 12' OF THE GROUND SURFACE. DRYWELL SHALL NOT BE PLACED WHERE BASE OF FACILITY HAS LESS THAN 5' OF SEPARATION TO WATER TABLE.
3. **SIZING:** DRYWELL SIZING CHART IS USED TO SIZE THE DRYWELL(S) BASED ON IMPERVIOUS AREA.
4. **TOP OF DRYWELL** MUST BE BELOW LOWEST FINISHED FLOOR.
5. **SETBACKS:** DRYWELL MUST BE 10' FROM FOUNDATIONS, 5' FROM PROPERTY LINES, AND 20' FROM CESSPOOLS.
6. **PIPING** MUST BE CAST IRON, ABS OR PVC. 3" PIPE REQUIRED FOR FACILITIES DRAINING UP TO 1500 SF, OTHERWISE 4" MINIMUM PIPE. UNIFORM PLUMBING CODE ALSO APPLIES.
7. **TRAPPED SILT BASIN:** OPTIONAL FOR ROOF RUNOFF OR PEDESTRIAN ONLY PAVED AREAS.

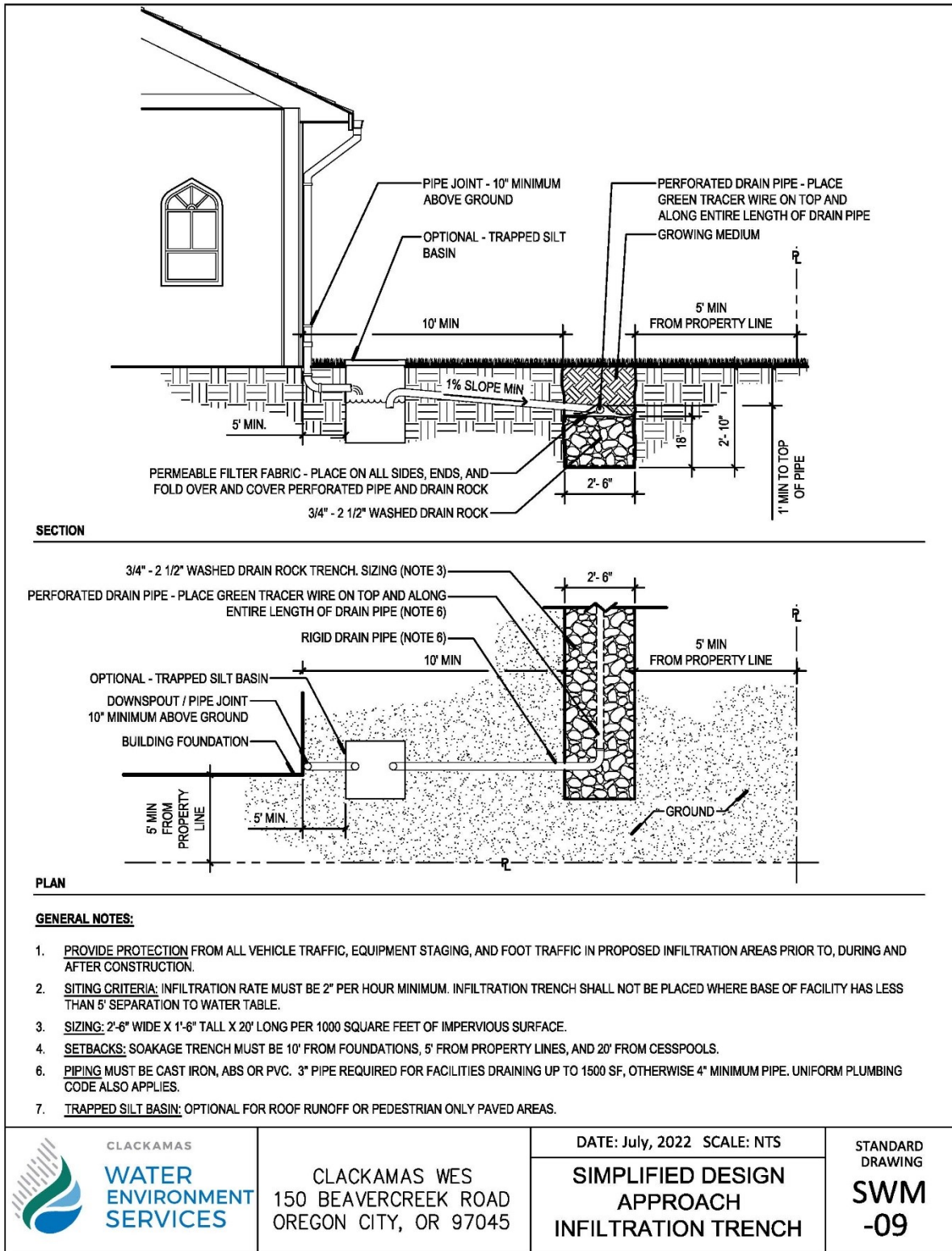
DRYWELL SIZING CHART								
ONCE APPROVAL HAS BEEN GIVEN FOR ON-SITE INFILTRATION OF STORMWATER, THE FOLLOWING CHART SHALL BE USED TO SELECT THE NUMBER AND SIZE OF DRYWELLS. GRAY BOXES ARE ACCEPTABLE.								
IMPERVIOUS AREA (SQ-FT)	28" DIAMETER				48" DIAMETER			
	DRYWELL DEPTH				DRYWELL DEPTH			
	5'	10'	15'	20'	5'	10'	15'	20'
1000								
2000								
3000								
4000								
5000								
6000								
7000								
8000								
9000								
10000								

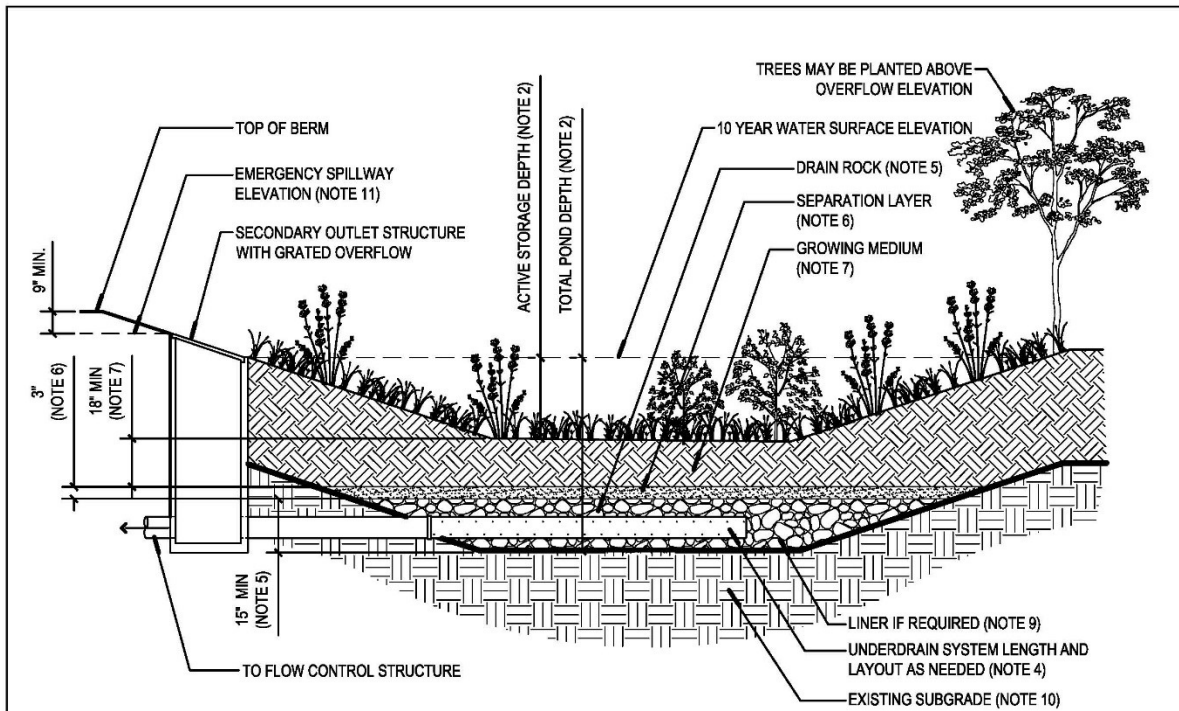


CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

DATE: July, 2022 SCALE: NTS
**SIMPLIFIED DESIGN
APPROACH DRYWELL**


STANDARD DRAWING
**SWM
-08**

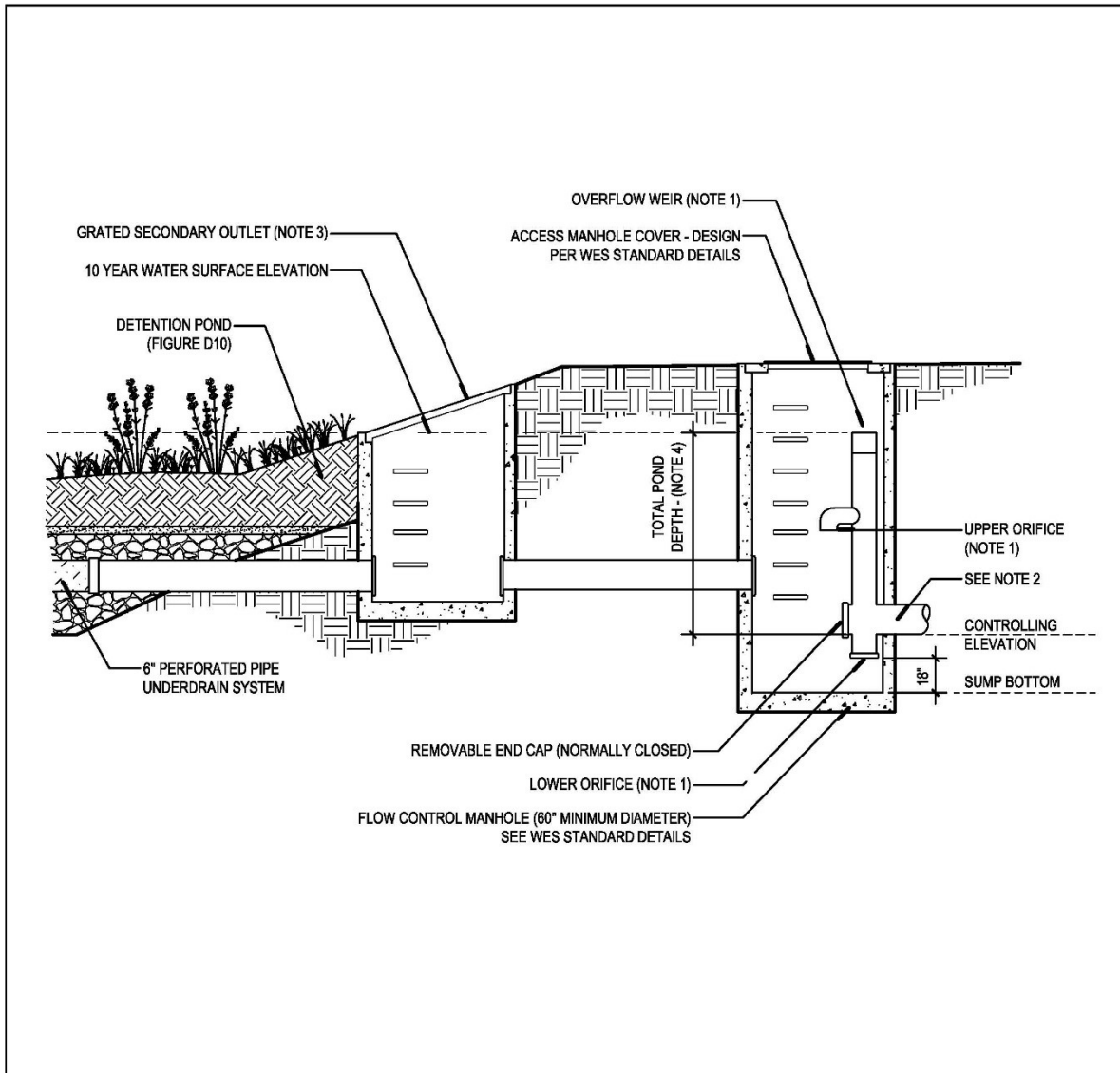




GENERAL NOTES:


1. PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC, EQUIPMENT STAGING, AND FOOT TRAFFIC IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING AND AFTER CONSTRUCTION. UNLESS REQUIRED BY SITE CONDITIONS, UNLINED PONDS ARE PREFERRED TO ALLOW MAXIMUM INFILTRATION.
2. DIMENSIONS:
 - ACTIVE STORAGE DEPTH (FROM TOP OF GROWING MEDIUM TO OVERFLOW ELEVATION): PER FACILITY SIZING MODEL
 - TOTAL POND DEPTH: 4' MINIMUM, PER FACILITY SIZING MODEL
 - BOTTOM SLOPE: 2.0% OR LESS
 - SIDE SLOPES OF DETENTION POND: 3:1 MAXIMUM
3. SETBACKS:
 - DETENTION POND MUST BE 10' FROM FOUNDATIONS AND 5' FROM PROPERTY LINES UNLESS APPROVED BY BUILDING OFFICIAL.
4. PIPING:
 - PERFORATED UNDERDRAIN PIPING: SHALL BE ABS SCH. 40, DUCTILE IRON OR PVC SCH. 40. 6" MINIMUM DIAMETER. PIPING MUST HAVE 1% GRADE AND FOLLOW THE UNIFORM PLUMBING CODE. PVC NOT ALLOWED ABOVE GROUND.
5. DRAIN ROCK:
 - SIZE: 1 1/2" - 3/4" WASHED
 - DEPTH: 15" MINIMUM
6. SEPARATION BETWEEN DRAIN ROCK AND GROWING MEDIUM: SHALL BE A 3" LAYER OF 3/4" - 1/4" OPEN GRADED AGGREGATE.
7. GROWING MEDIUM:
 - 18" MINIMUM
8. VEGETATION: FOLLOW LANDSCAPE PLANS
9. WATERPROOF LINER (IF REQUIRED): SHALL BE 30 MIL PVC OR EQUIVALENT FOR DETENTION POND.
10. SEASONAL HIGH GROUNDWATER SEPARATION:
 - SEPARATION DISTANCE AS REQUIRED BY WES.
11. EMERGENCY SPILLWAY SIZED TO CONVEY THE 100 - YEAR DESIGN STORM. PROVIDE 6" MINIMUM FREEBOARD ABOVE THE 100 - YEAR DESIGN STORM.

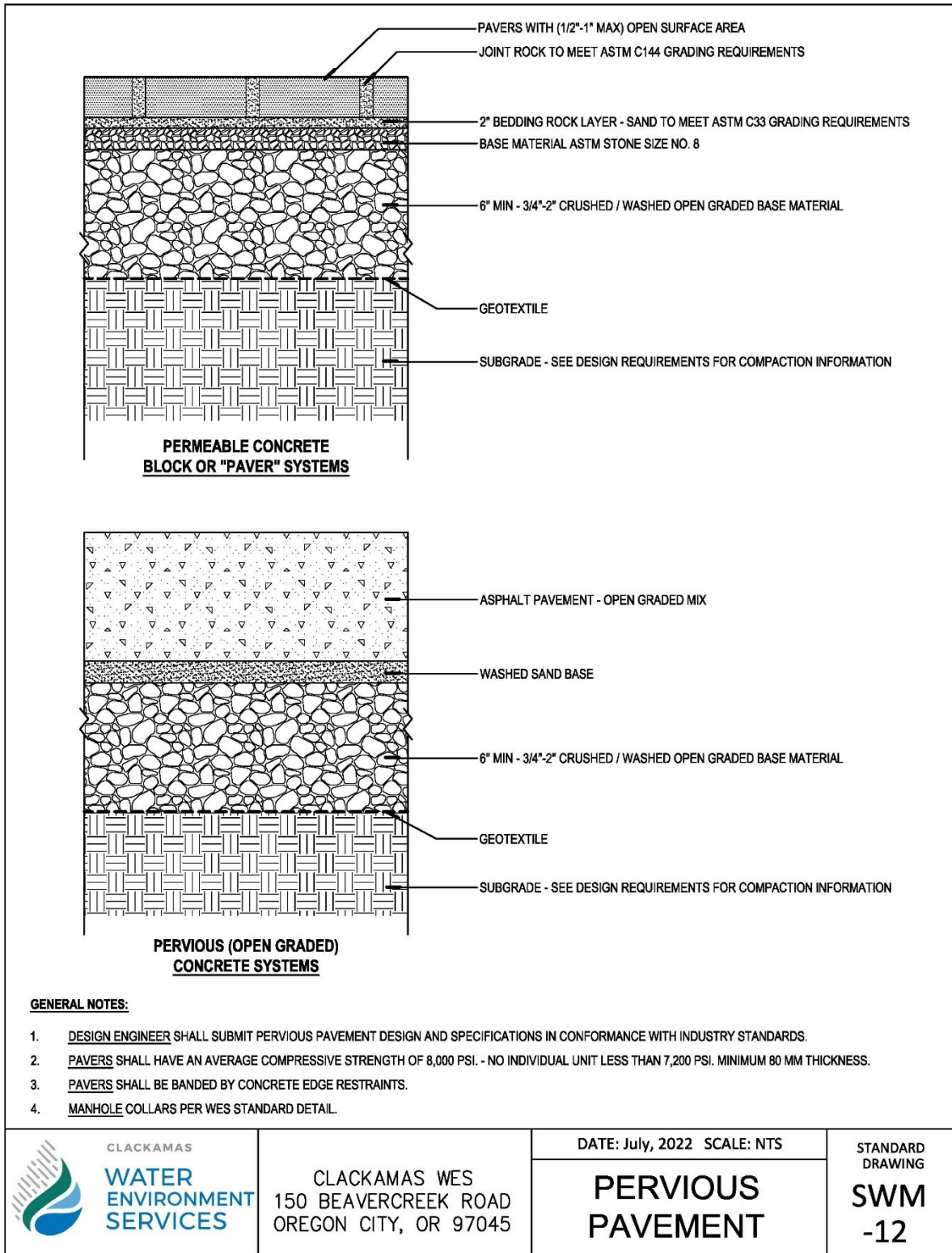
	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING SWM -10
		DETENTION POND	

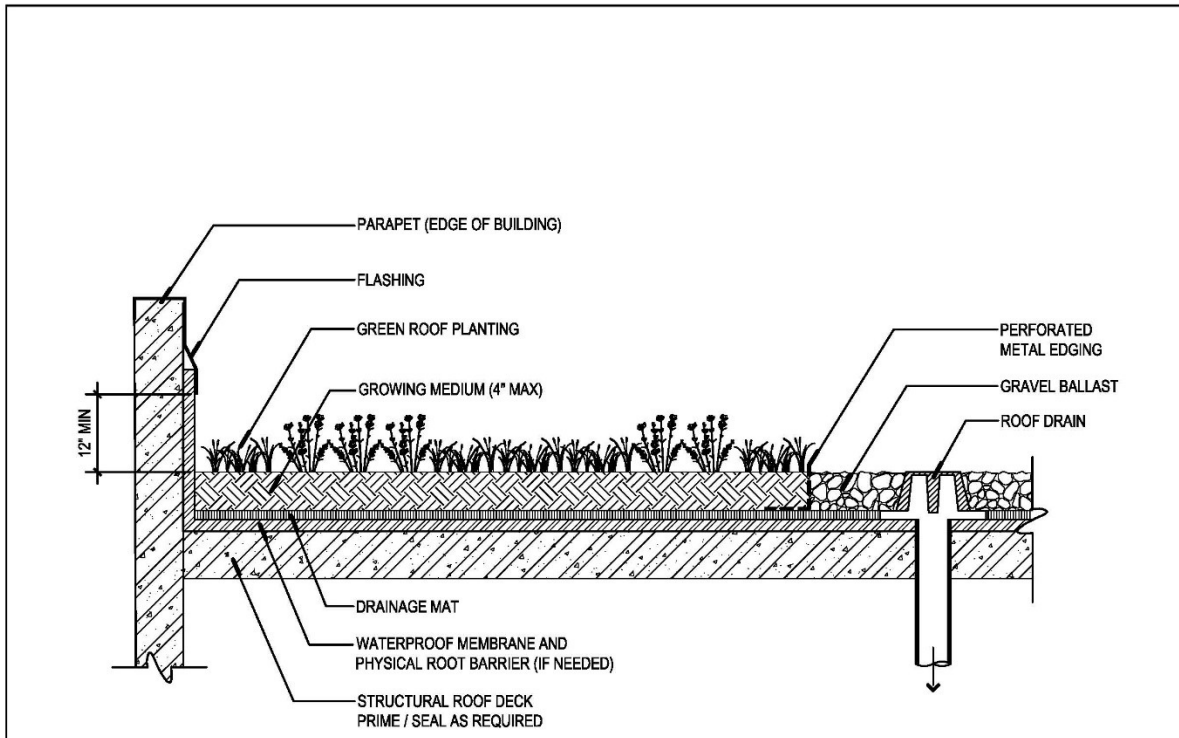


GENERAL NOTES:

1. ORIFICE AND WEIR DIMENSIONS AND ELEVATION DETERMINED THROUGH FACILITY SIZING MODEL.
2. PIPE SIZING DETERMINED BY ENGINEER.
3. SECONDARY OUTLET SIZED FOR PEAK DESIGN STORM.
4. TOTAL POND DEPTH - PER FACILITY SIZING MODEL, INCLUDES GROWING MEDIA, SEPARATION LAYER, AND DRAIN ROCK AS SHOWN ON FIGURE D1.


	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	DATE: July, 2022 SCALE: NTS	STANDARD DRAWING
		DETENTION POND FLOW CONTROL STRUCTURE	SWM -11

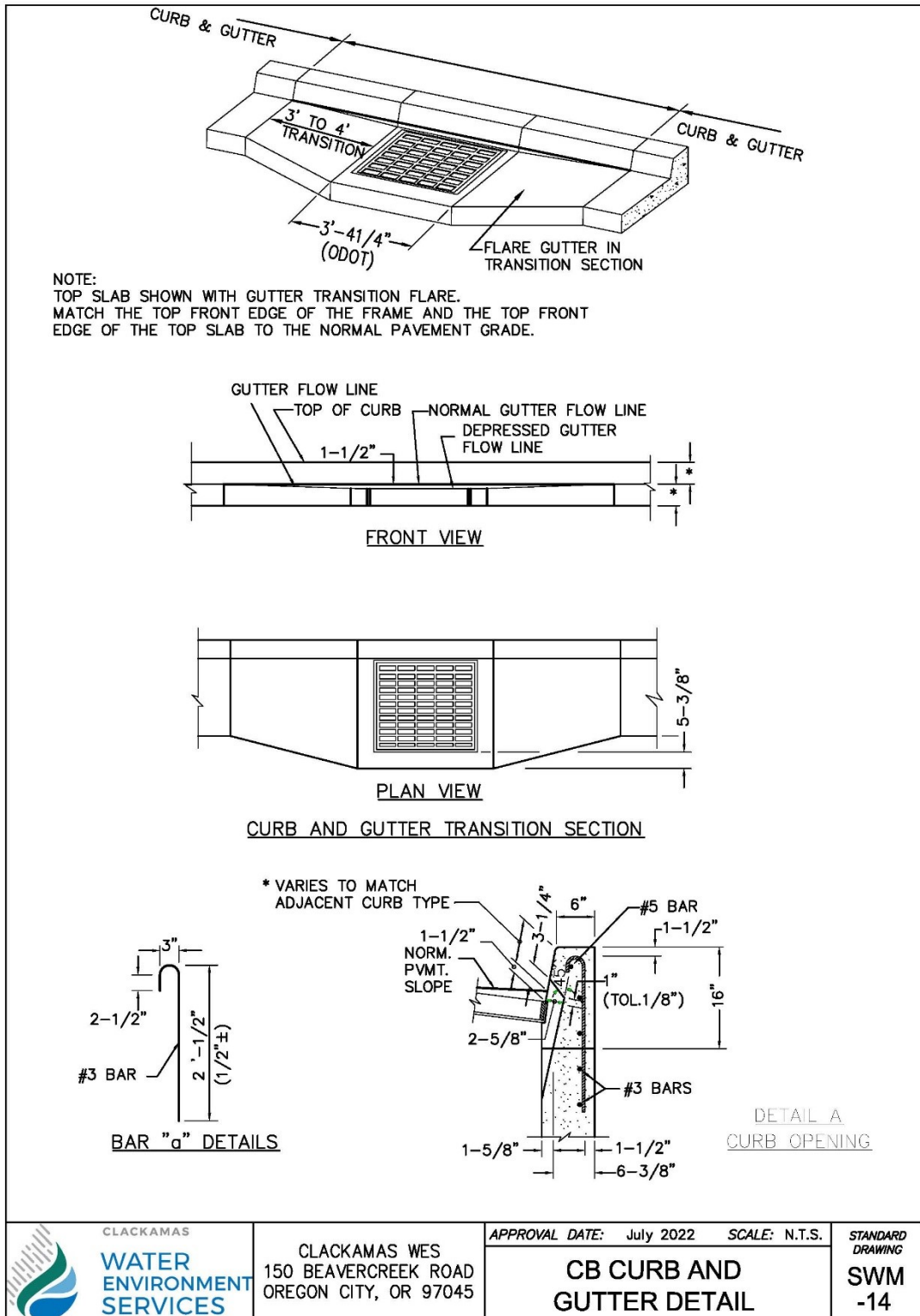


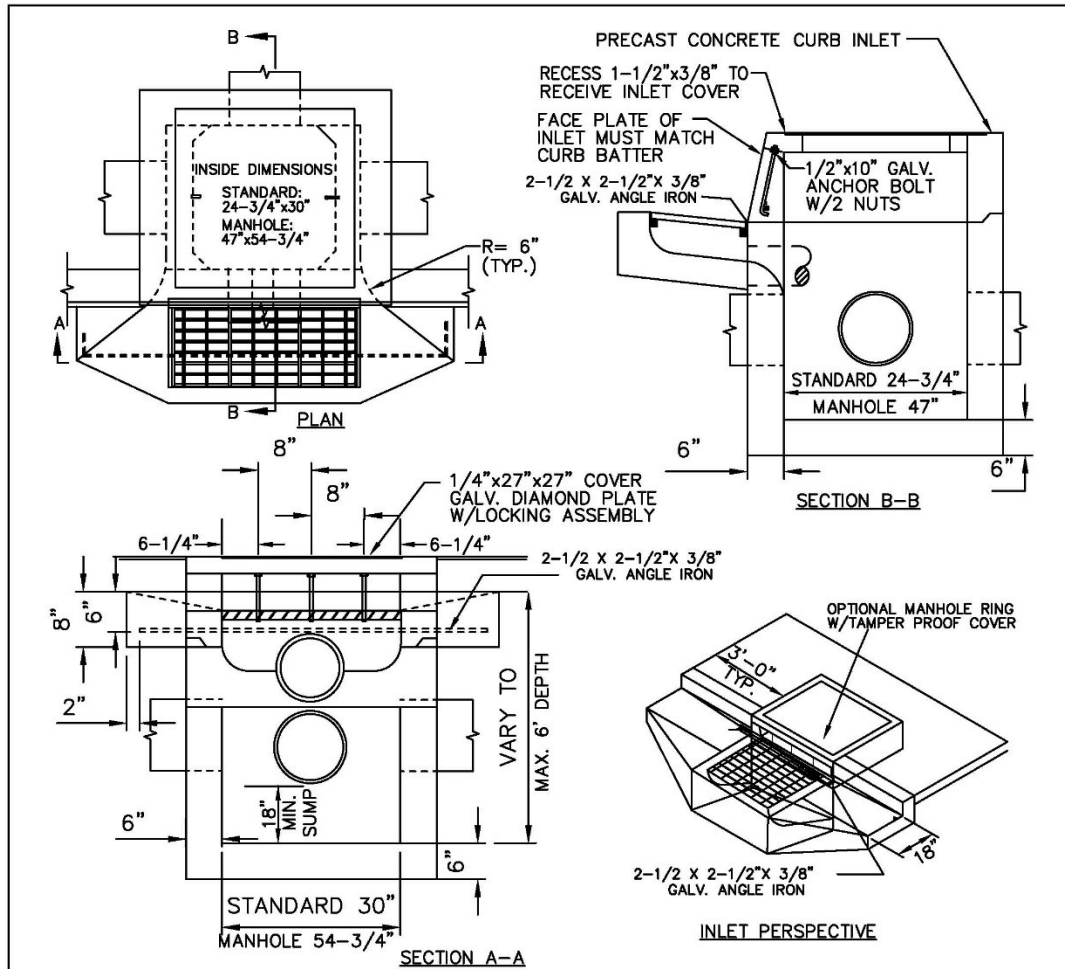


GENERAL NOTES:

1. DESIGN ENGINEER OR LANDSCAPE ARCHITECT SHALL SUBMIT GREEN ROOF DESIGN AND SPECIFICATIONS IN CONFORMANCE WITH INDUSTRY STANDARDS.


 <p>CLACKAMAS WATER ENVIRONMENT SERVICES</p>	<p>CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045</p>	DATE: July 2022 SCALE: NTS	STANDARD DRAWING
		GREEN ROOF	SWM -13

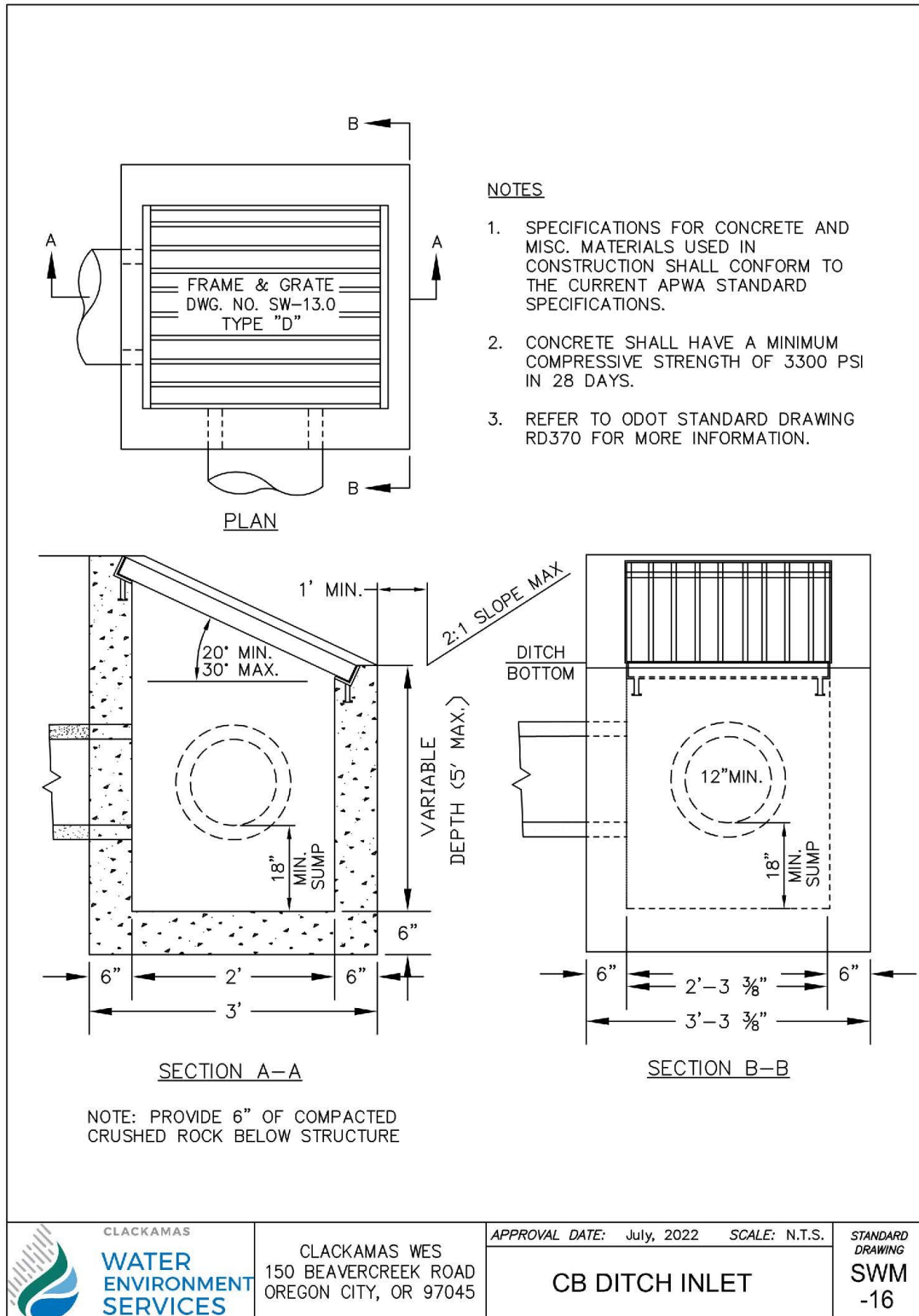


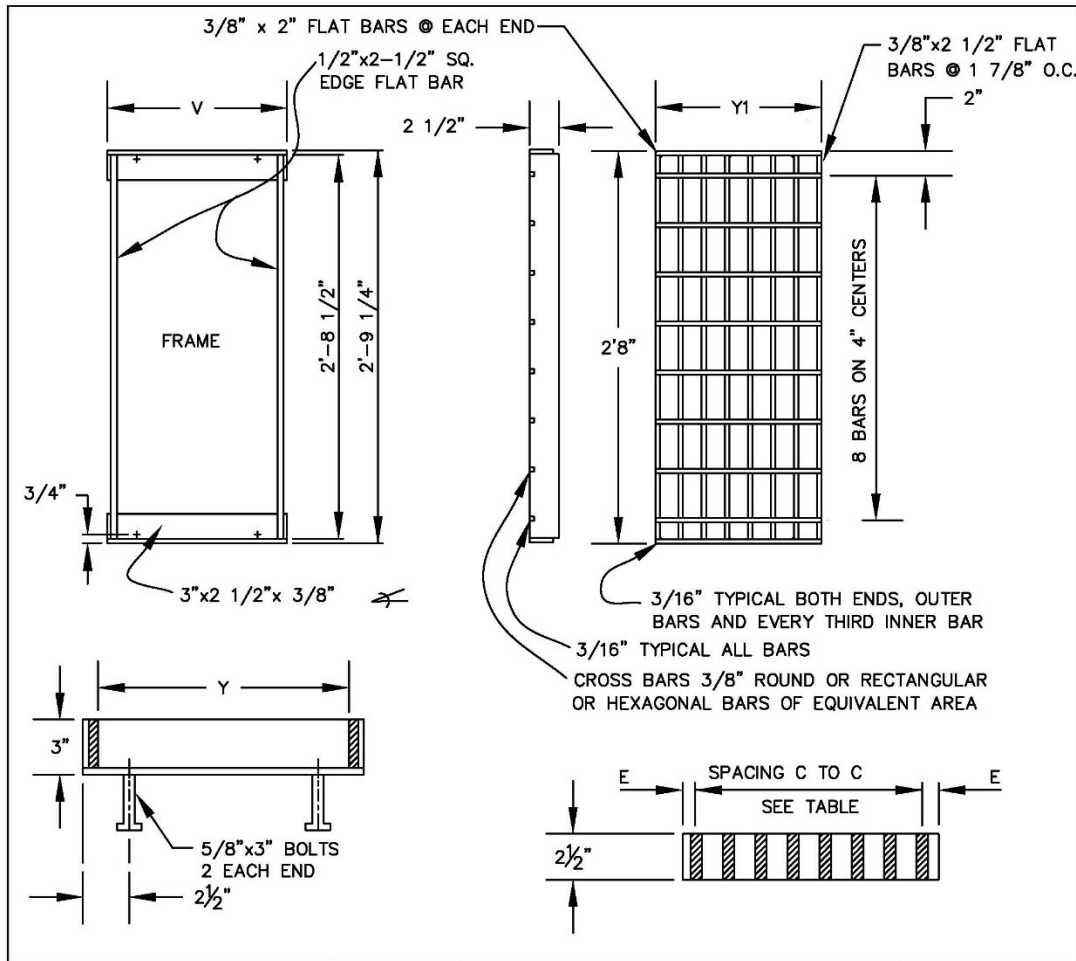


NOTES

1. CURB INLET CATCH BASIN SHALL CONFORM TO CURRENT ODOT/APWA SPECIFICATION. THE INLET SHALL HAVE AN 8" CURB EXPOSURE AT THE GRATE.
2. GRATED INLET SHALL BE POURED IN PLACE, A SHALLOW PRECAST INLET, OR A COMBINATION INLET GUTTER PLATE WITH LID (NEENAH R-3335-B CURB PIECE OR APPROVED EQUAL.)
3. CONNECT THE GRATED INLET TO THE CATCH BASIN BY A MINIMUM 12" DIAMETER CONCRETE PIPE GROUTED INTO BOTH SECTIONS. A SLOT MAY BE USED IF THE CURB INLET SECTION IS PRECAST AND DESIGNED TO CARRY THE LOADING. A METAL CURB PIECE MAY BE USED.
4. THE CURB INLET CATCH BASIN MAY USE A GB INLET WITH A SINGLE GRATE.
5. AN 18" SUMP IS REQUIRED.
6. ALL METAL PARTS MUST BE HOT DIPPED GALVANIZED AFTER FABRICATION.
7. THE LATCH SPRING MUST HAVE 50 LB. OF COMPRESSIVE STRENGTH.
8. SPECIFICATIONS FOR CONCRETE AND MISC. MATERIALS USED IN CONSTRUCTION SHALL CONFORM TO THE CURRENT ODOT/APWA STANDARD SPECIFICATIONS.
9. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3300 PSI IN 28 DAYS.

	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	APPROVAL DATE: July, 2022 SCALE: N.T.S.	STANDARD DRAWING SWM -15
	CB CURB INLET		



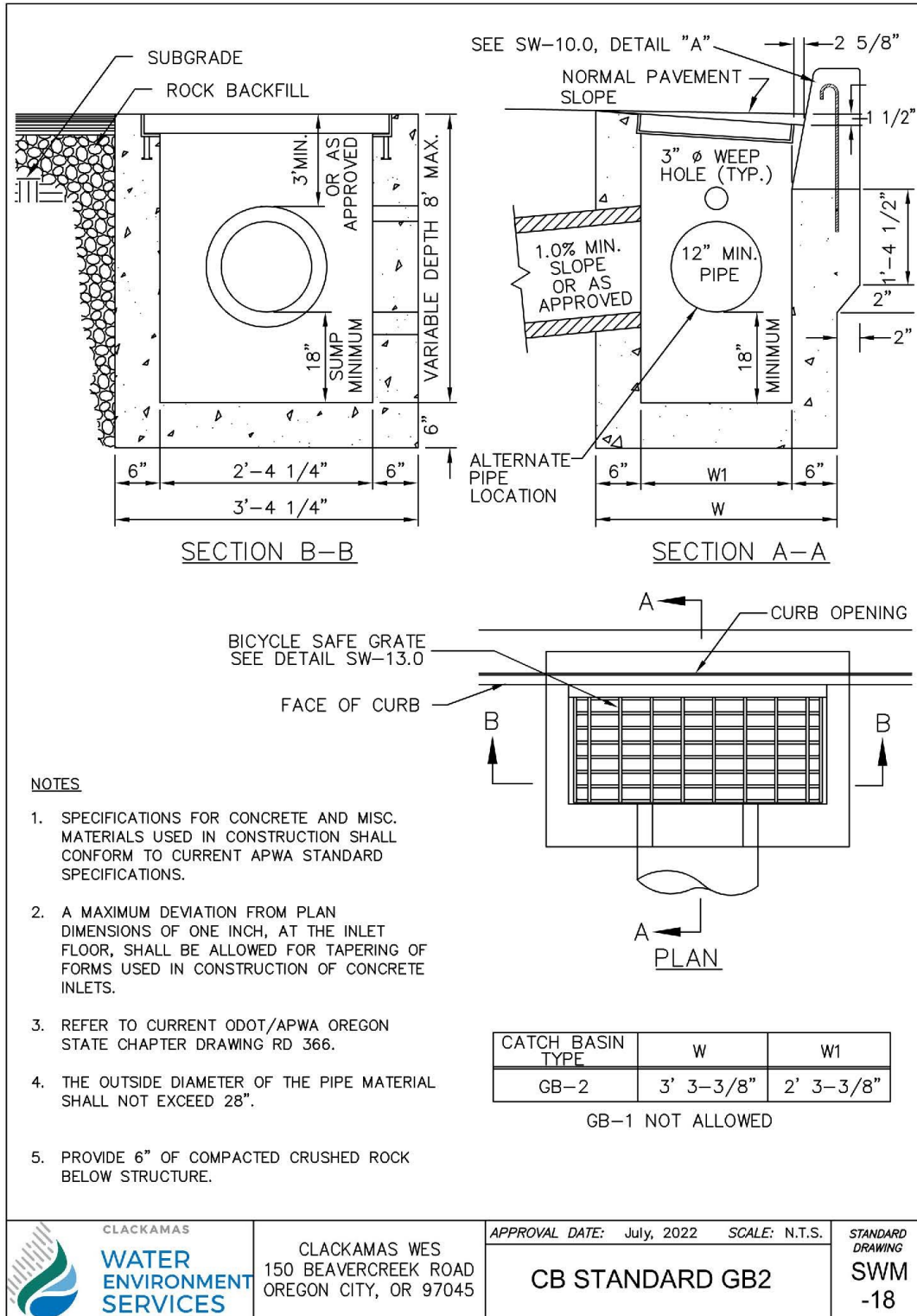


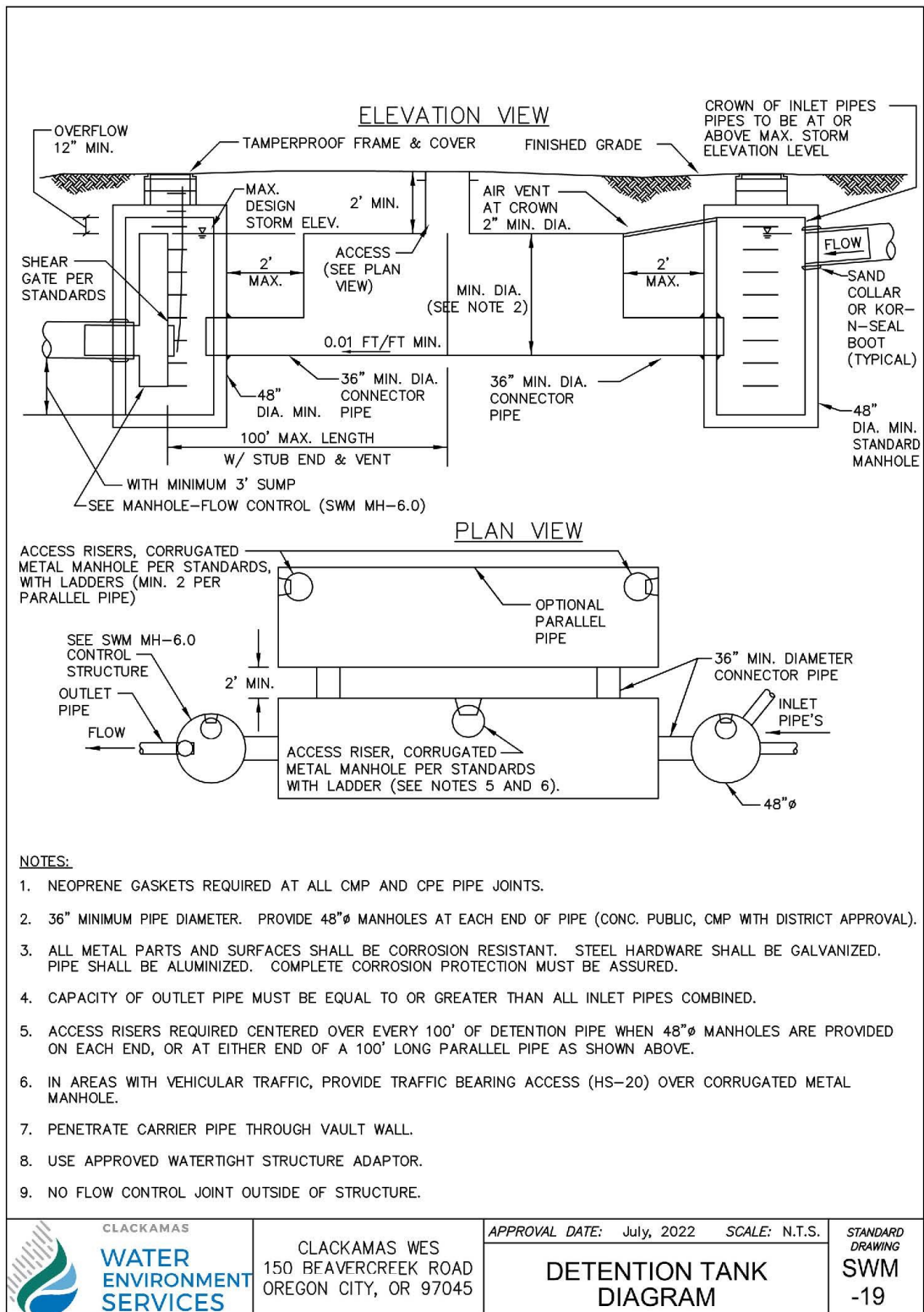
CATCH BASIN TYPE	V	Y	Y1	E	SPACING C TO C	NO. OF BARS PER GRATE	REMARKS
GB-2	2'-4 3/4"	2'-3 3/8"	1'-1 1/2"	5/8"	1 3/4"	8	2-GRATES
D	2'-4 3/4"	2'-3 3/8"	2'-3"	1 1/2"	3"	9	
GB	1'-3 1/4"	1'-1 7/8"	1'-1 1/2"	5/8"	1 3/4"	8	1-GRATE

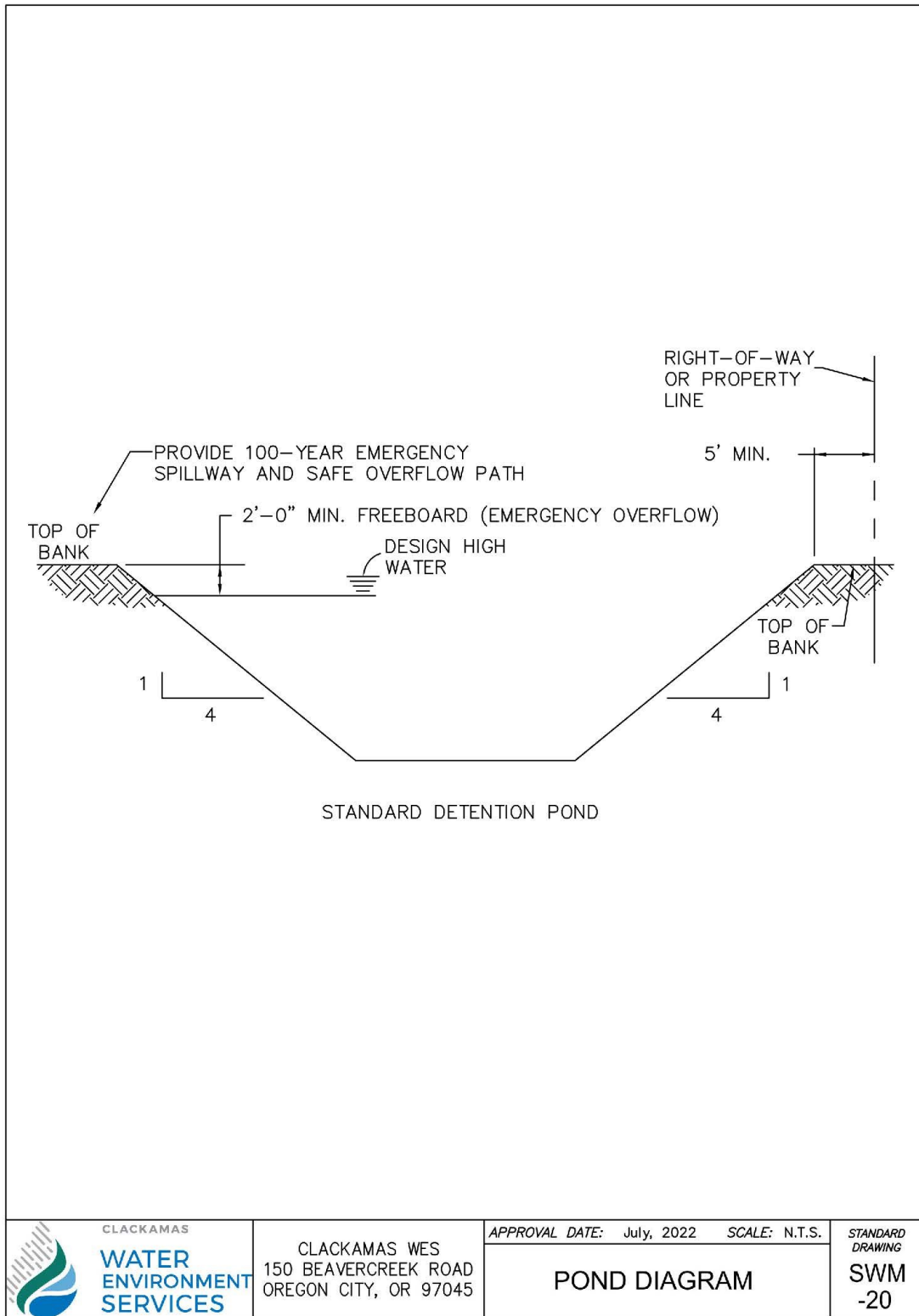
NOTES

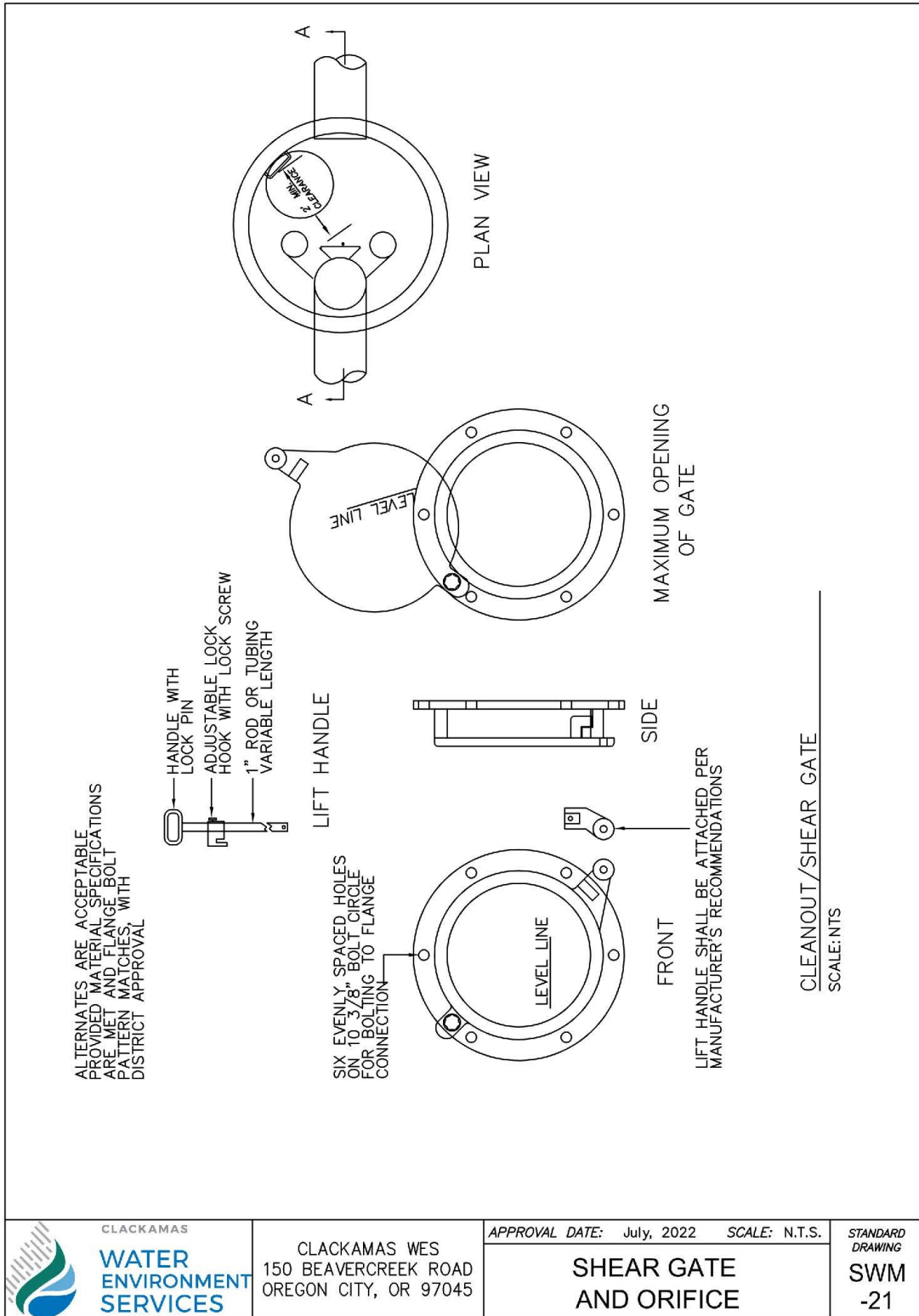
1. MATERIALS AND FABRICATION SHALL CONFORM TO THE CURRENT APWA STANDARD SPECIFICATIONS.
2. 3/8" CROSS BARS SHALL BE FLUSH WITH THE GRATE SURFACE AND MAY BE FILLET WELDED, RESISTANCE WELDED OR ELECTROFORGED TO BEARING BARS.
3. GB CATCH BASIN FOR USE WITH CURB INLET CATCH BASIN WITH GRATE ONLY.

	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	APPROVAL DATE: July, 2022 SCALE: N.T.S.	STANDARD DRAWING SWM -17
		CB FRAME AND GRATE	







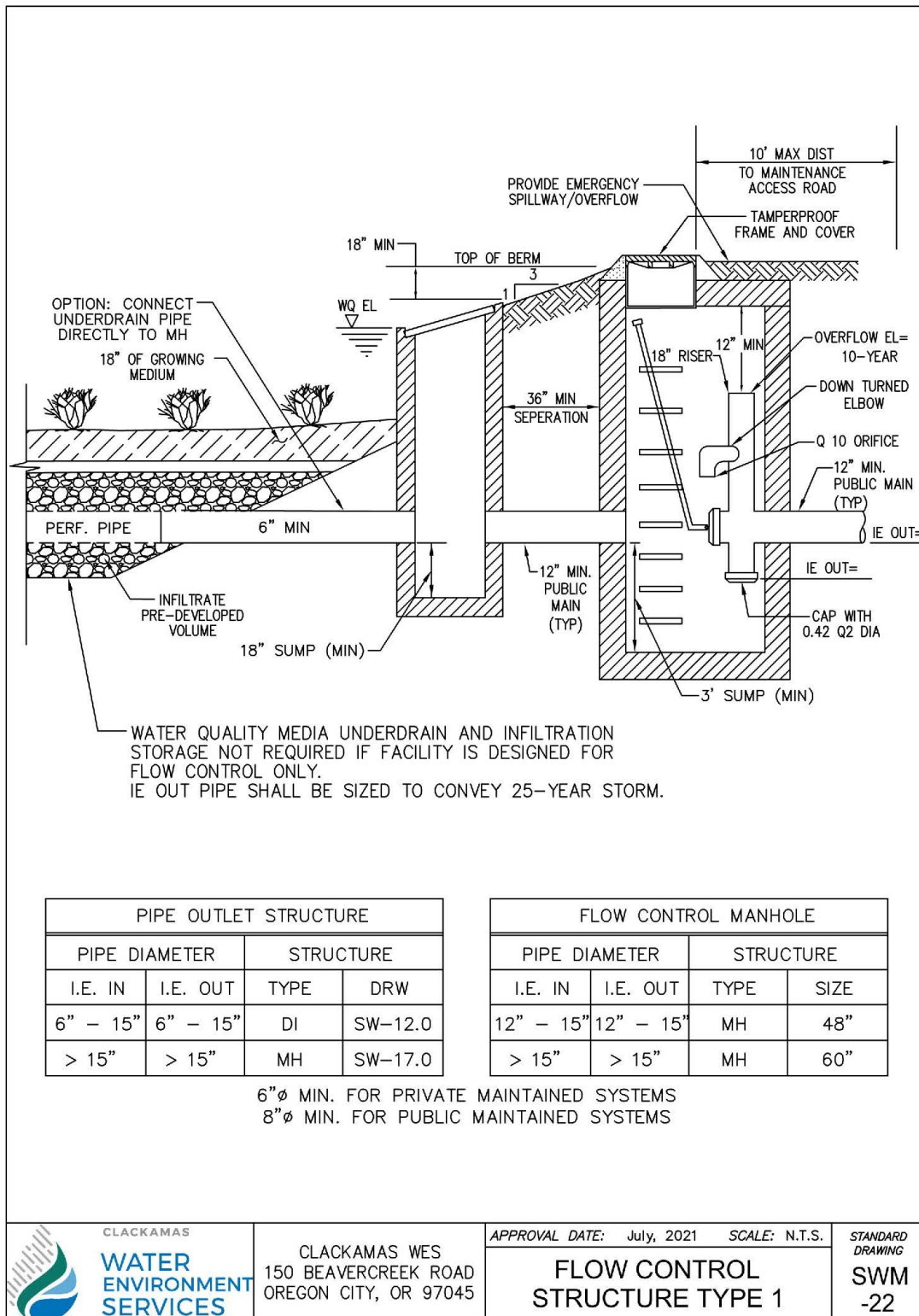


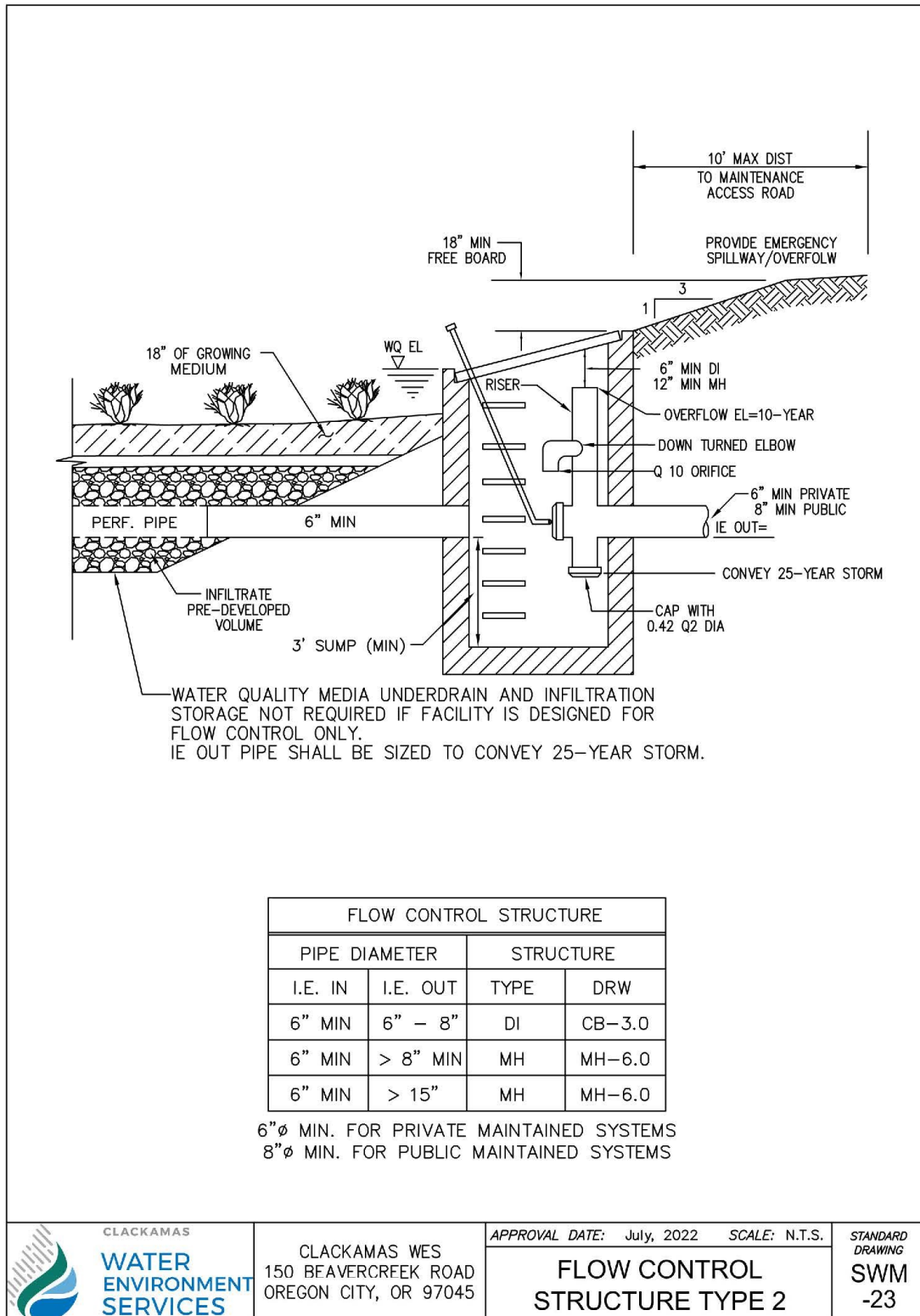
CLACKAMAS
WATER ENVIRONMENT SERVICES

CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

APPROVAL DATE: July, 2022 SCALE: N.T.S.
SHEAR GATE AND ORIFICE

STANDARD DRAWING
SWM -21



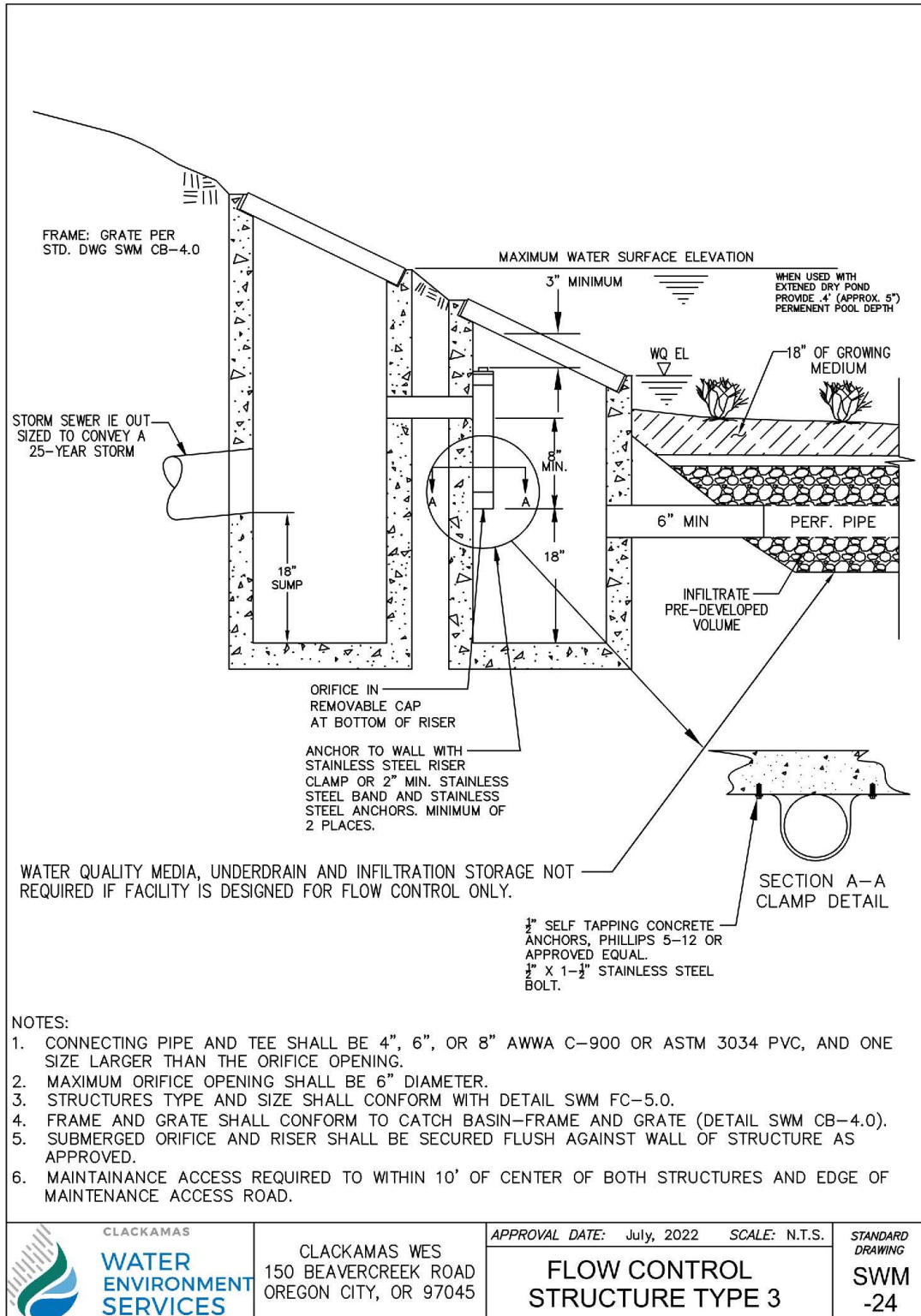


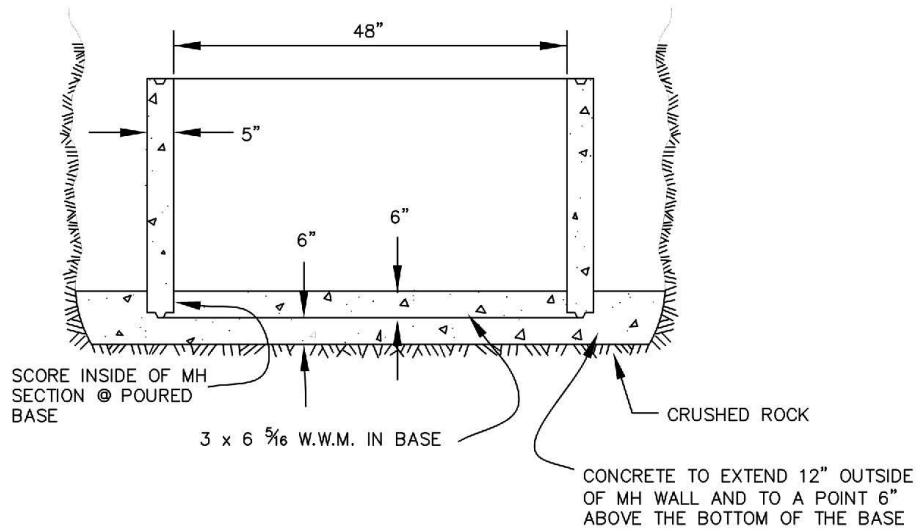
CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

APPROVAL DATE: July, 2022 SCALE: N.T.S.

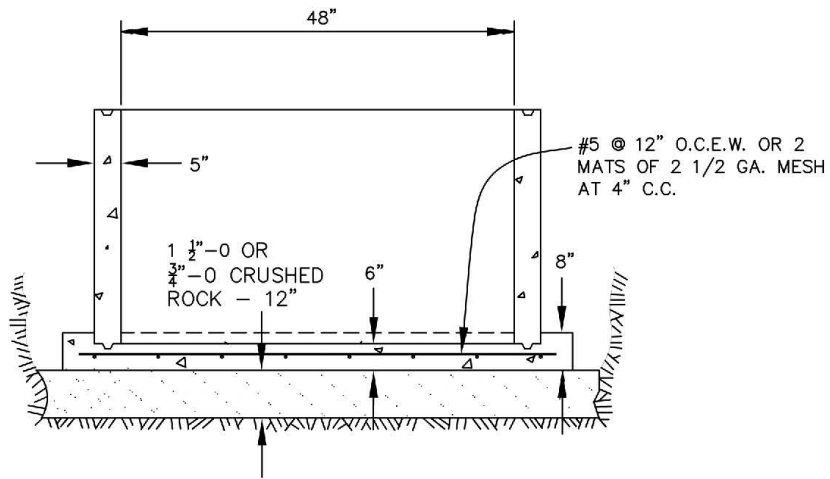
**FLOW CONTROL
STRUCTURE TYPE 2**

STANDARD
DRAWING
**SWM
-23**






POURED IN PLACE MANHOLE BASE

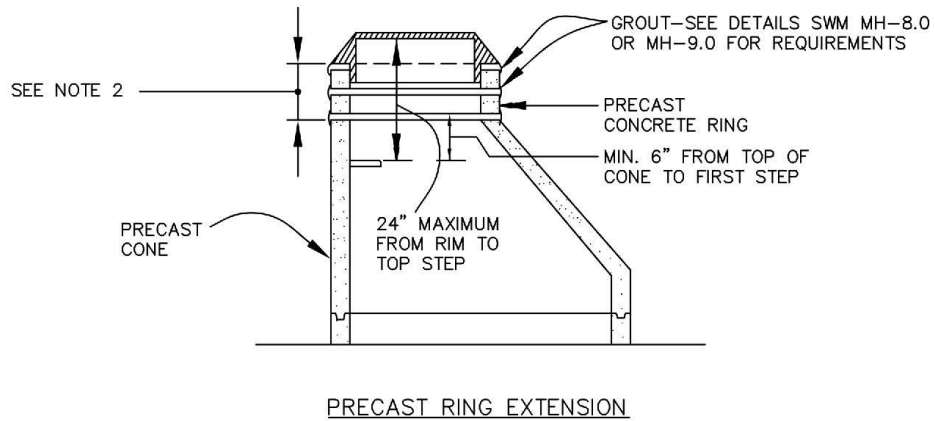
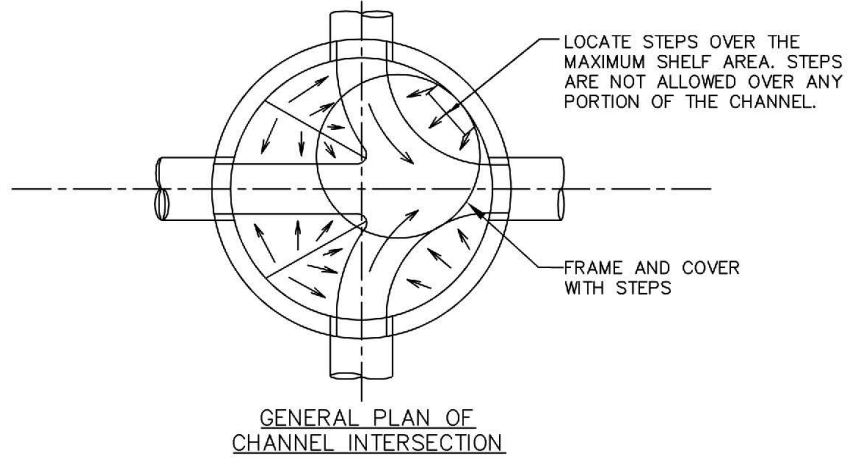


PRE-CAST MANHOLE BASE

NOTES


1. SPECIFICATIONS FOR CONCRETE AND MISCELLANEOUS MATERIALS USED IN CONSTRUCTION SHALL CONFORM TO CURRENT ODOT/APWA STANDARD SPECIFICATIONS.

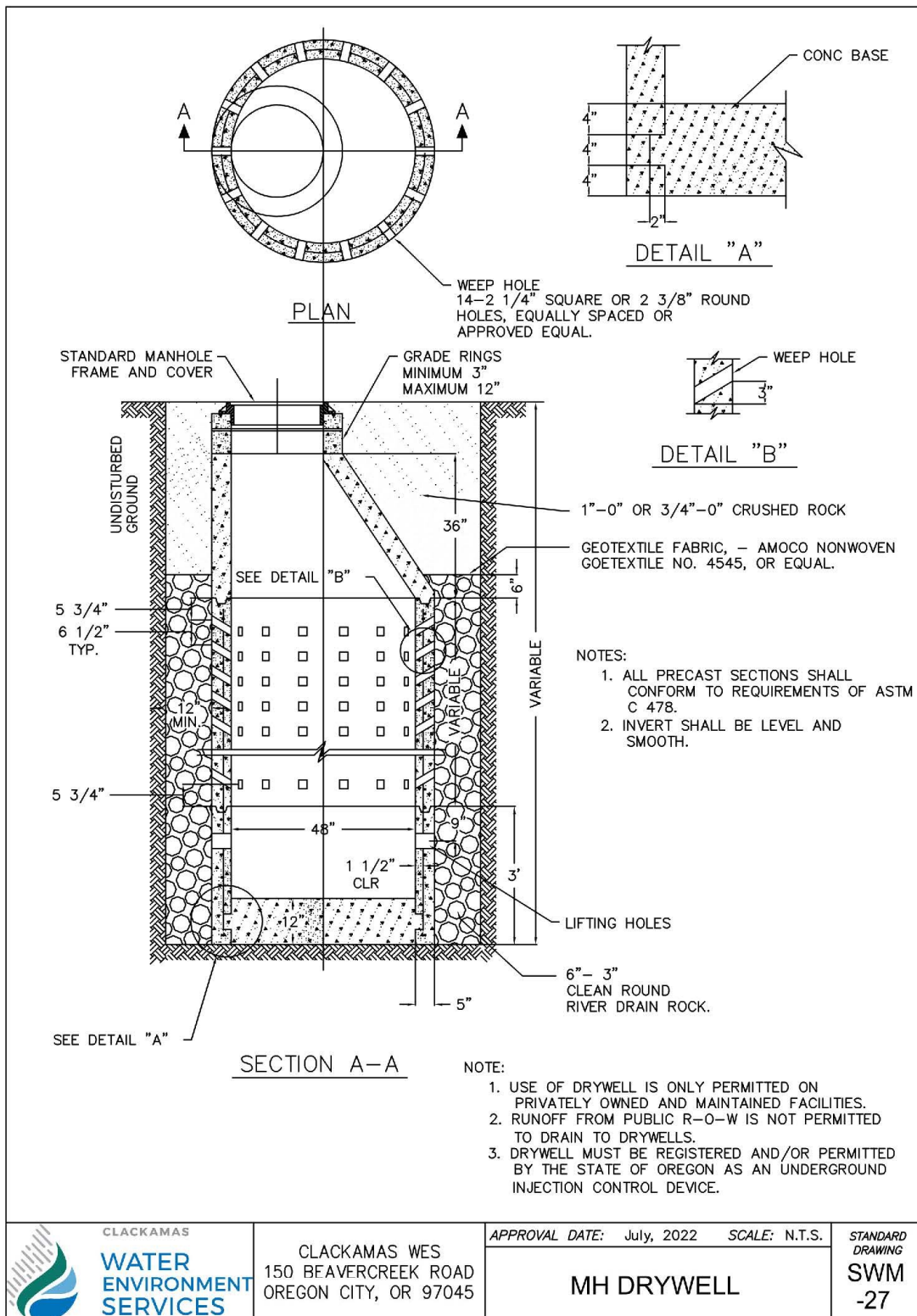
 <p>CLACKAMAS WATER ENVIRONMENT SERVICES</p>	<p>CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045</p>	<p>APPROVAL DATE: July, 2022 SCALE: N.T.S.</p>	<p>STANDARD DRAWING</p>
		<p>MANHOLE BASE</p>	<p>SWM -25</p>



NOTES

1. SPECIFICATIONS FOR CONCRETE AND MISCELLANEOUS MATERIALS USED IN CONSTRUCTION SHALL CONFORM TO CURRENT APWA STANDARD SPECIFICATIONS.
2. NUMBER OF RISER RINGS ALLOWED SHALL NOT EXCEED 12" MAXIMUM.

 <p>CLACKAMAS WATER ENVIRONMENT SERVICES</p>	<p>CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045</p>	<p>APPROVAL DATE: July, 2022 SCALE: N.T.S.</p>	<p>STANDARD DRAWING</p>
		<p>MH CHANNEL AND RING EXTENSION</p>	<p>SWM -26</p>

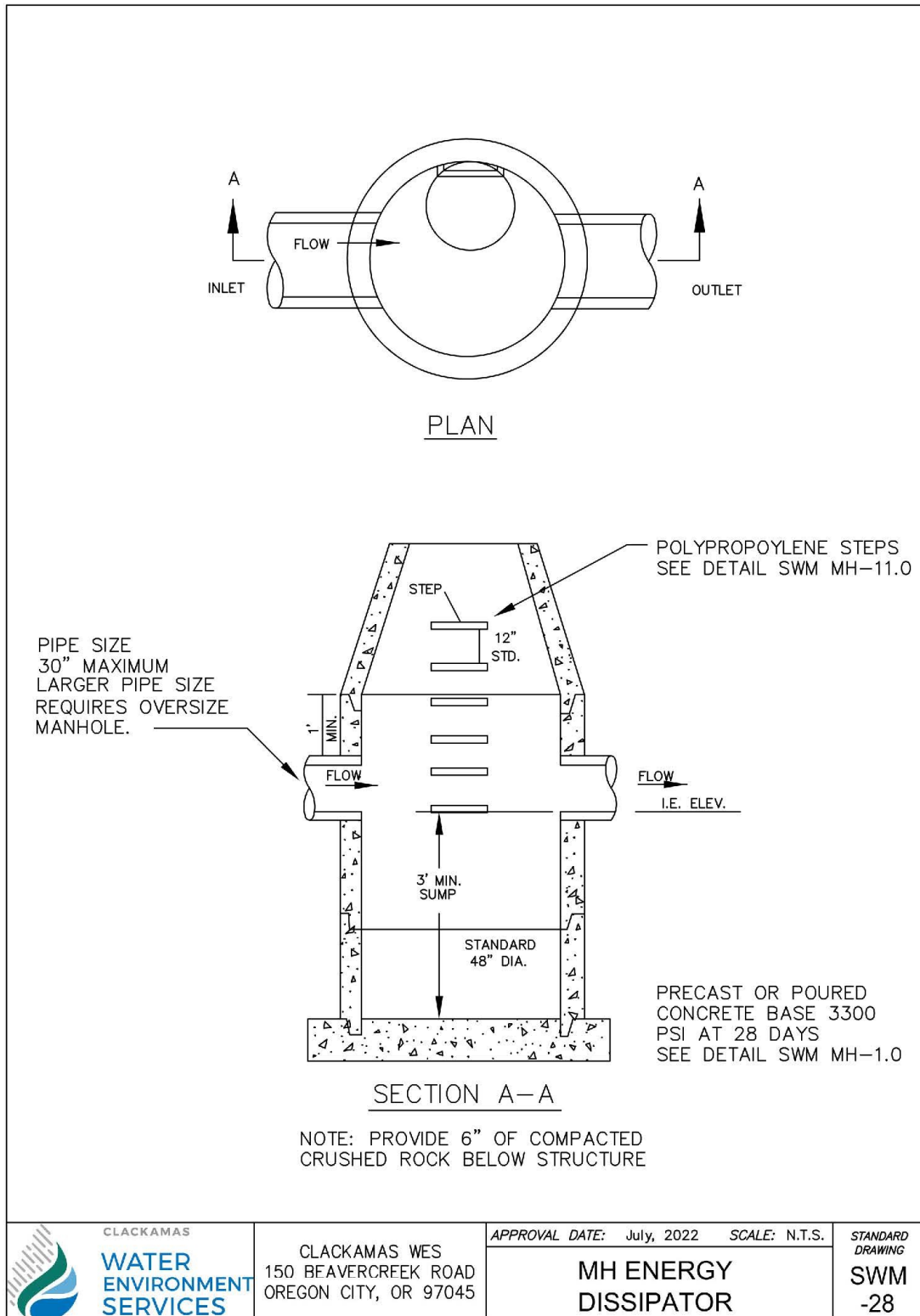


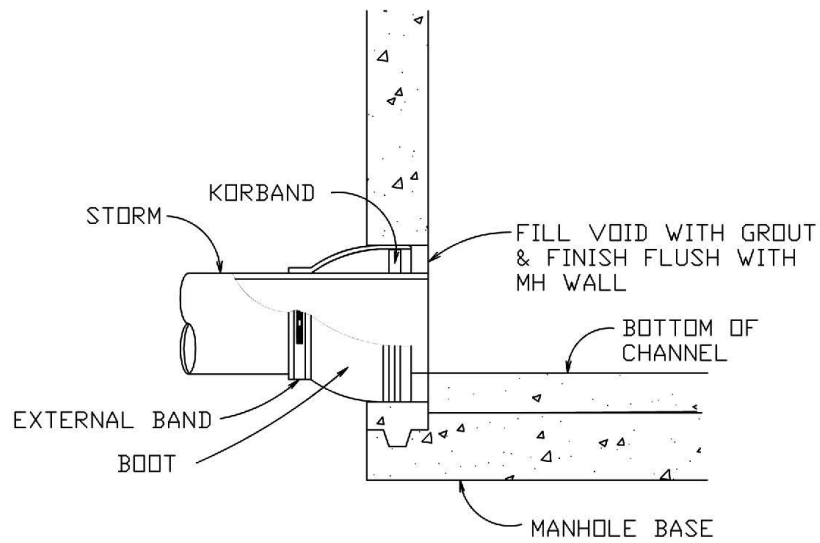
CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

APPROVAL DATE: July, 2022 SCALE: N.T.S.


MH DRYWELL

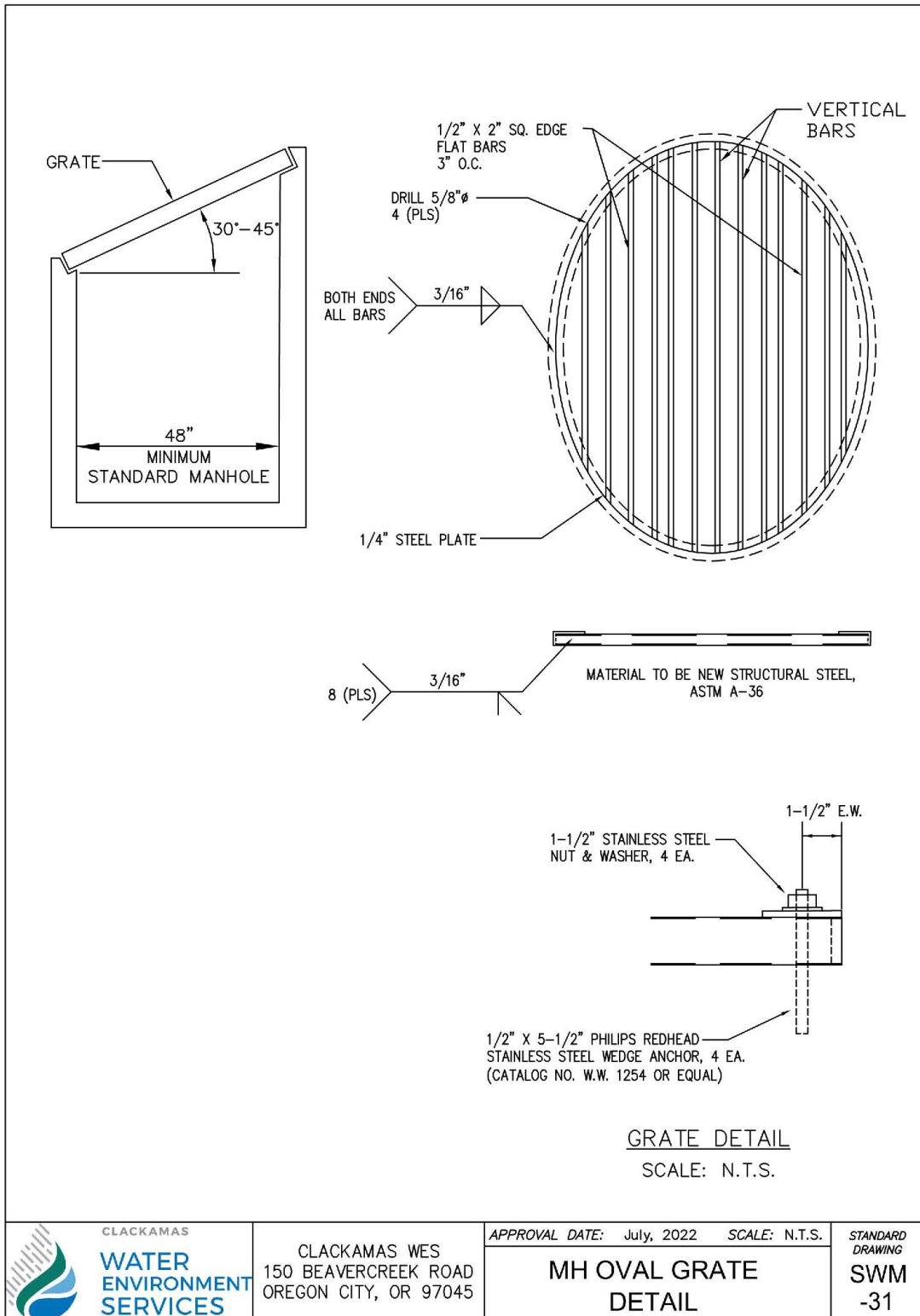
STANDARD DRAWING
SWM
-27

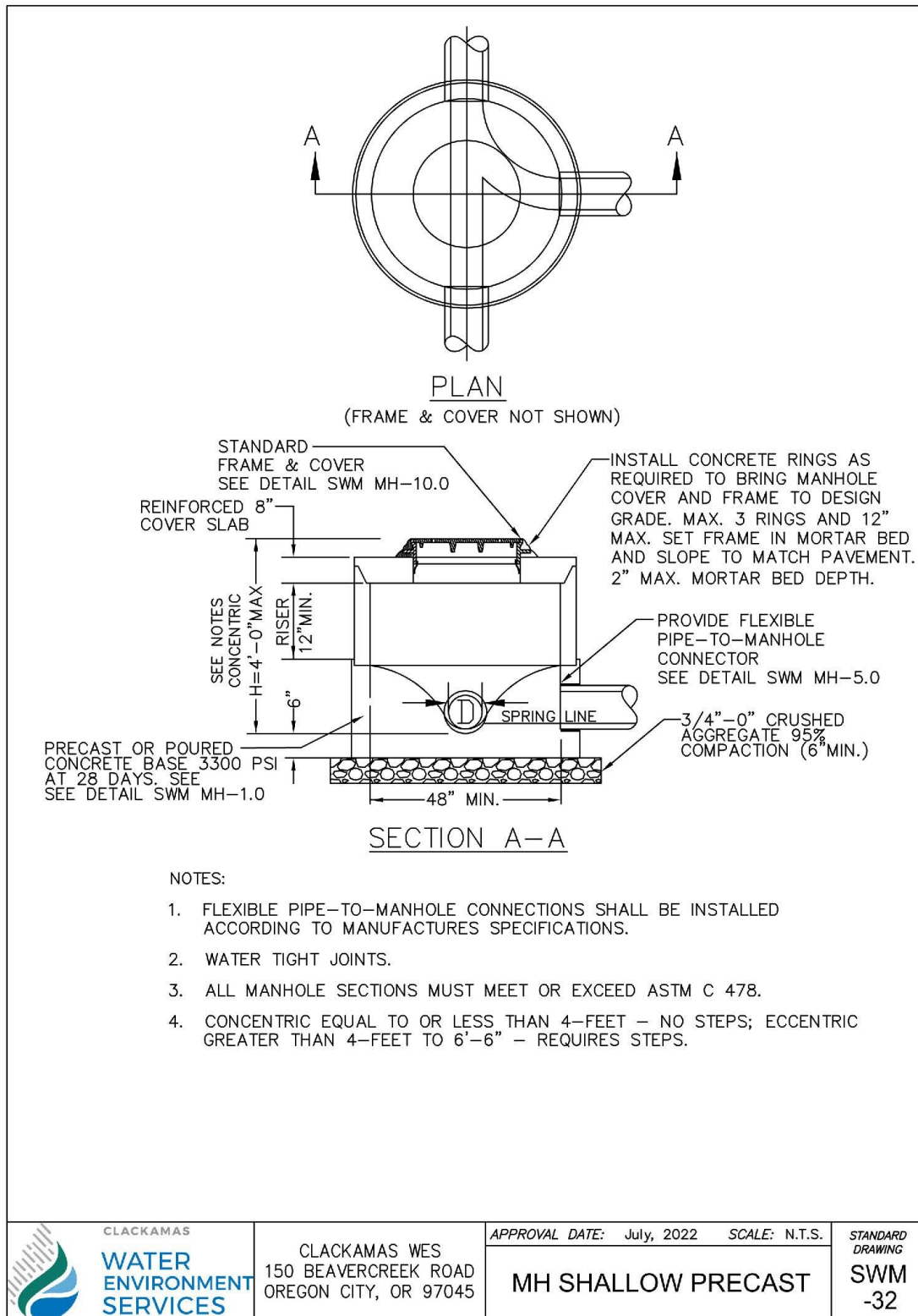


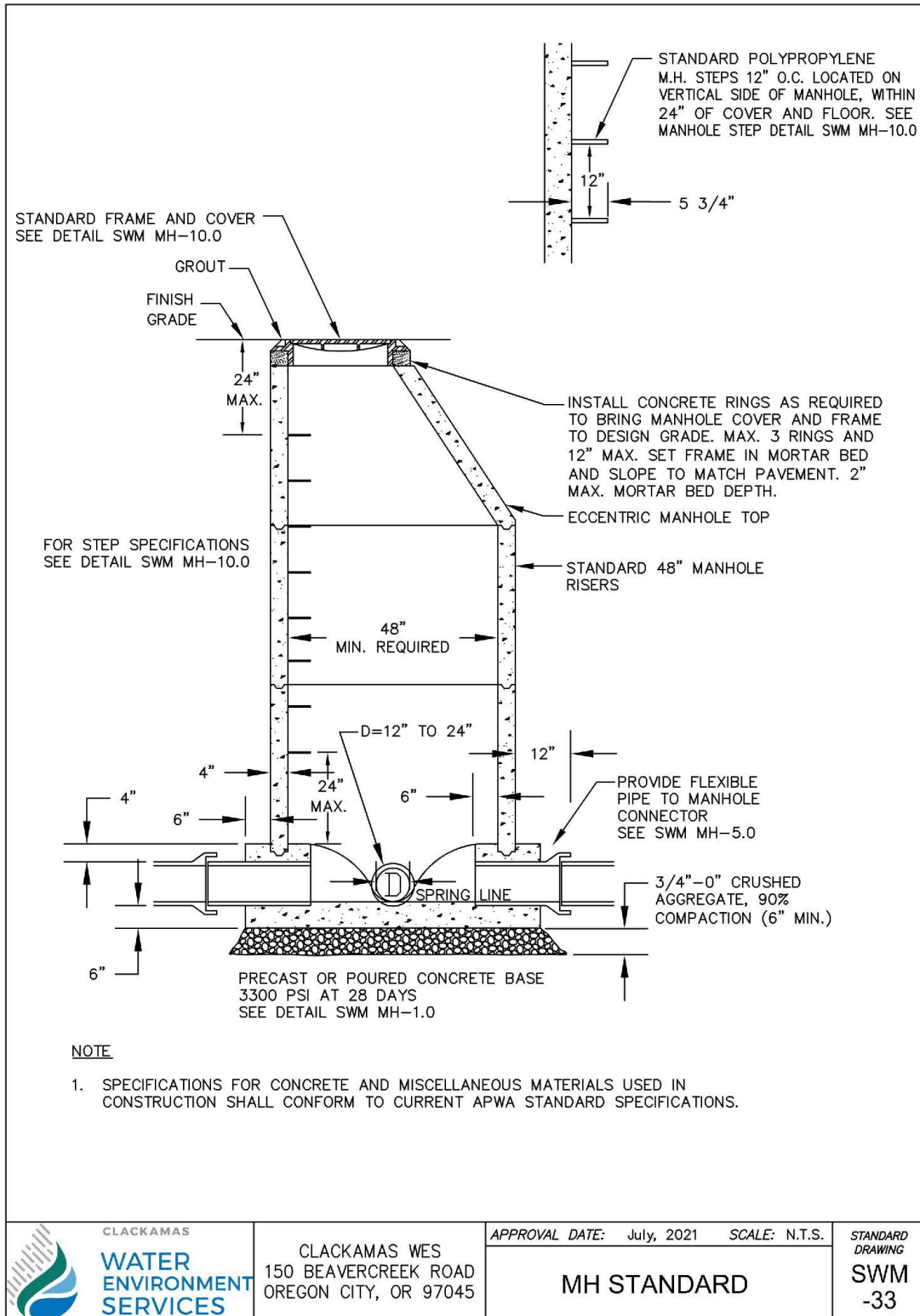


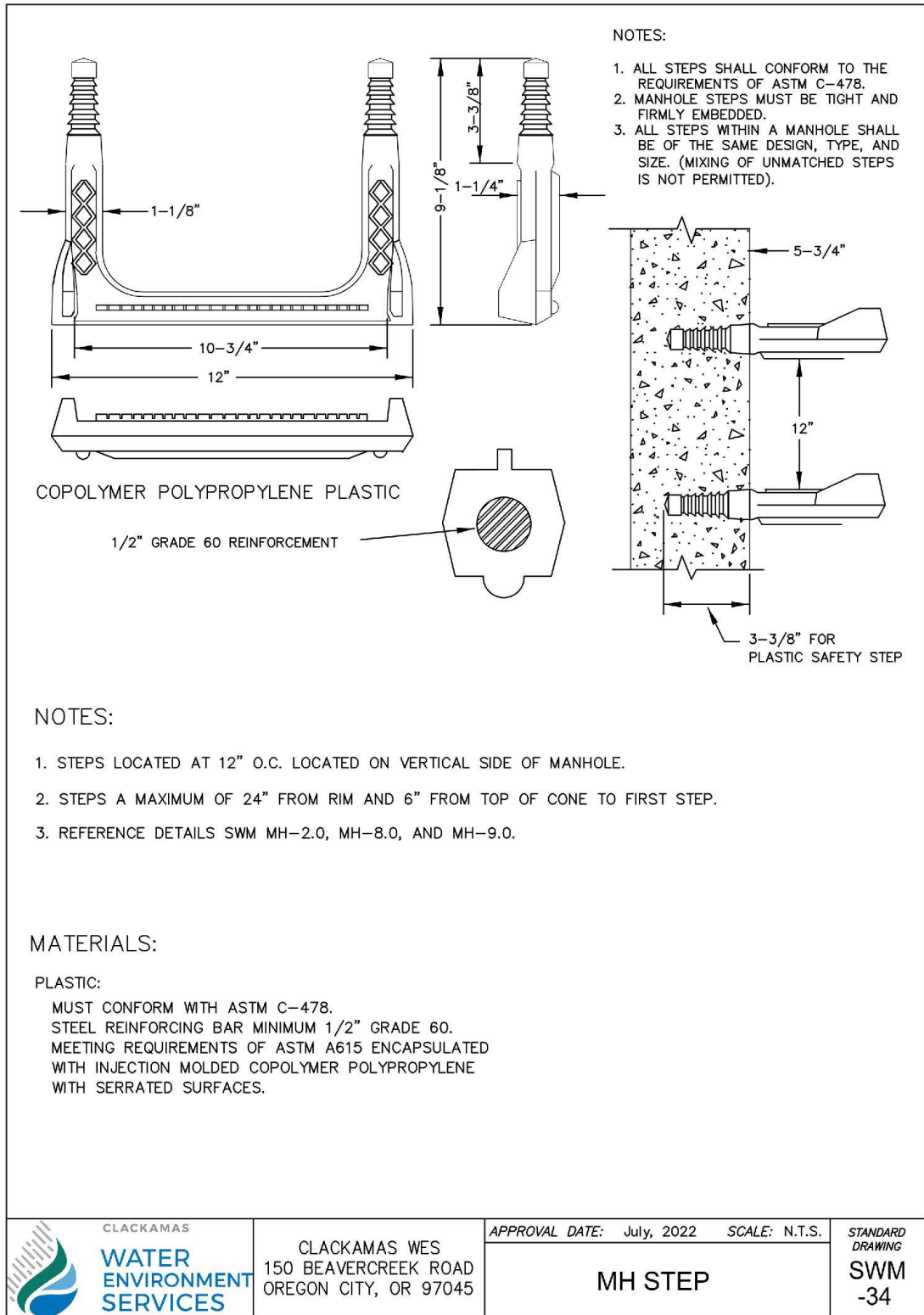
FLEXIBLE MANHOLE CONNECTION
(KOR-N-SEAL OR EQUAL)

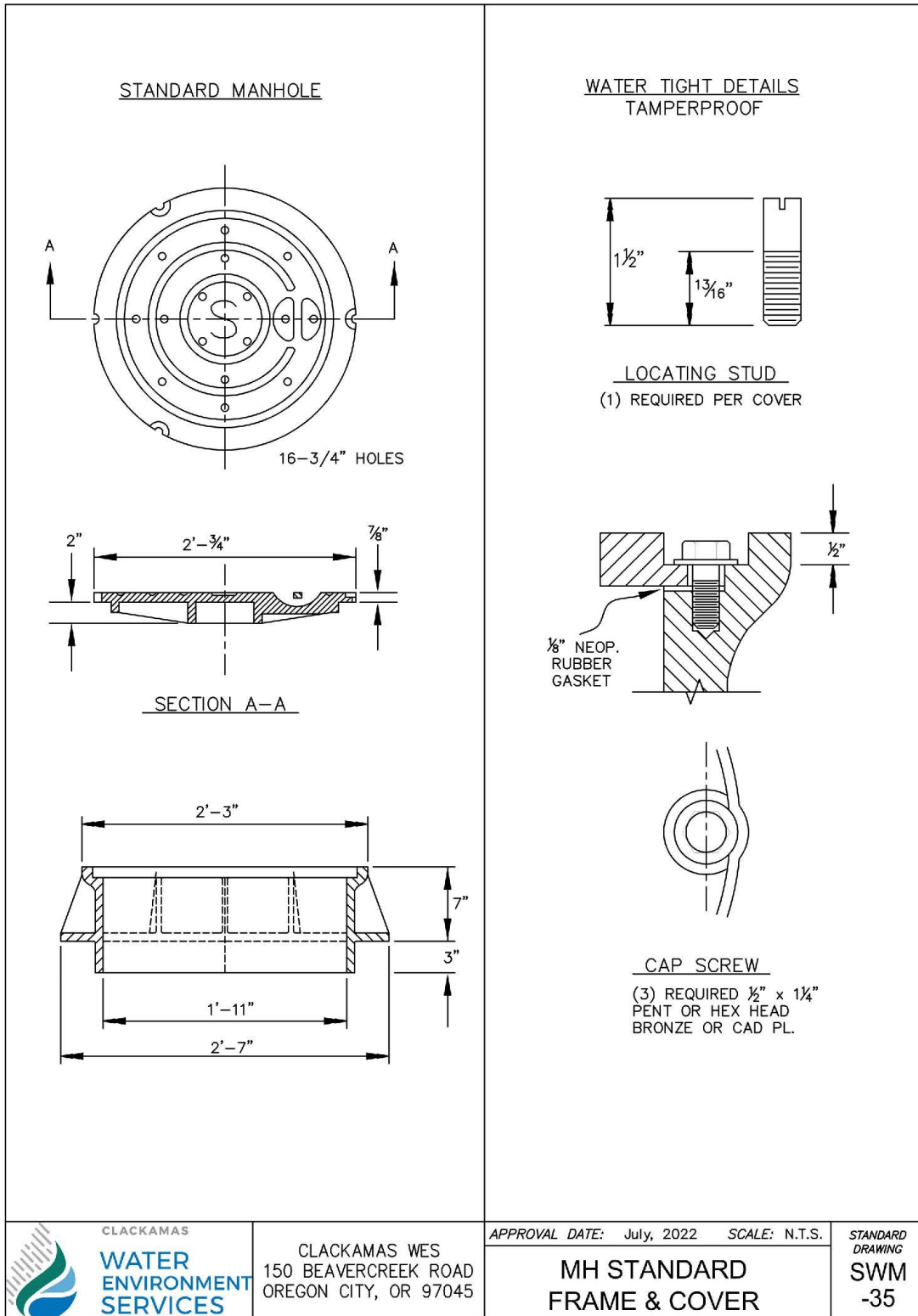
 <p>CLACKAMAS WATER ENVIRONMENT SERVICES</p>	<p>CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045</p>	<p>APPROVAL DATE: July, 2022 SCALE: N.T.S.</p>	<p>STANDARD DRAWING</p>
		<p>MH FLEXIBLE CONNECTION</p>	<p>SWM -29</p>

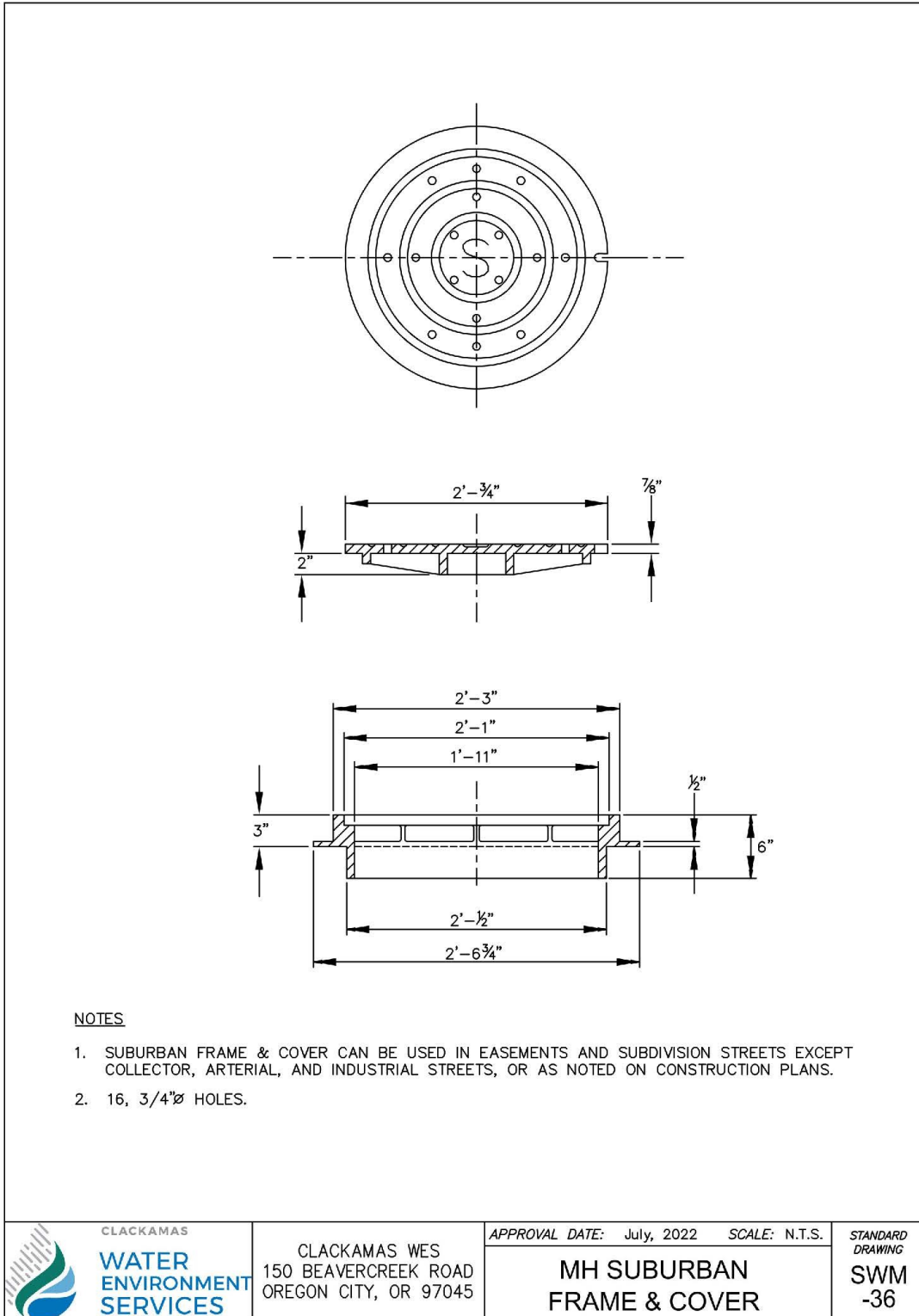


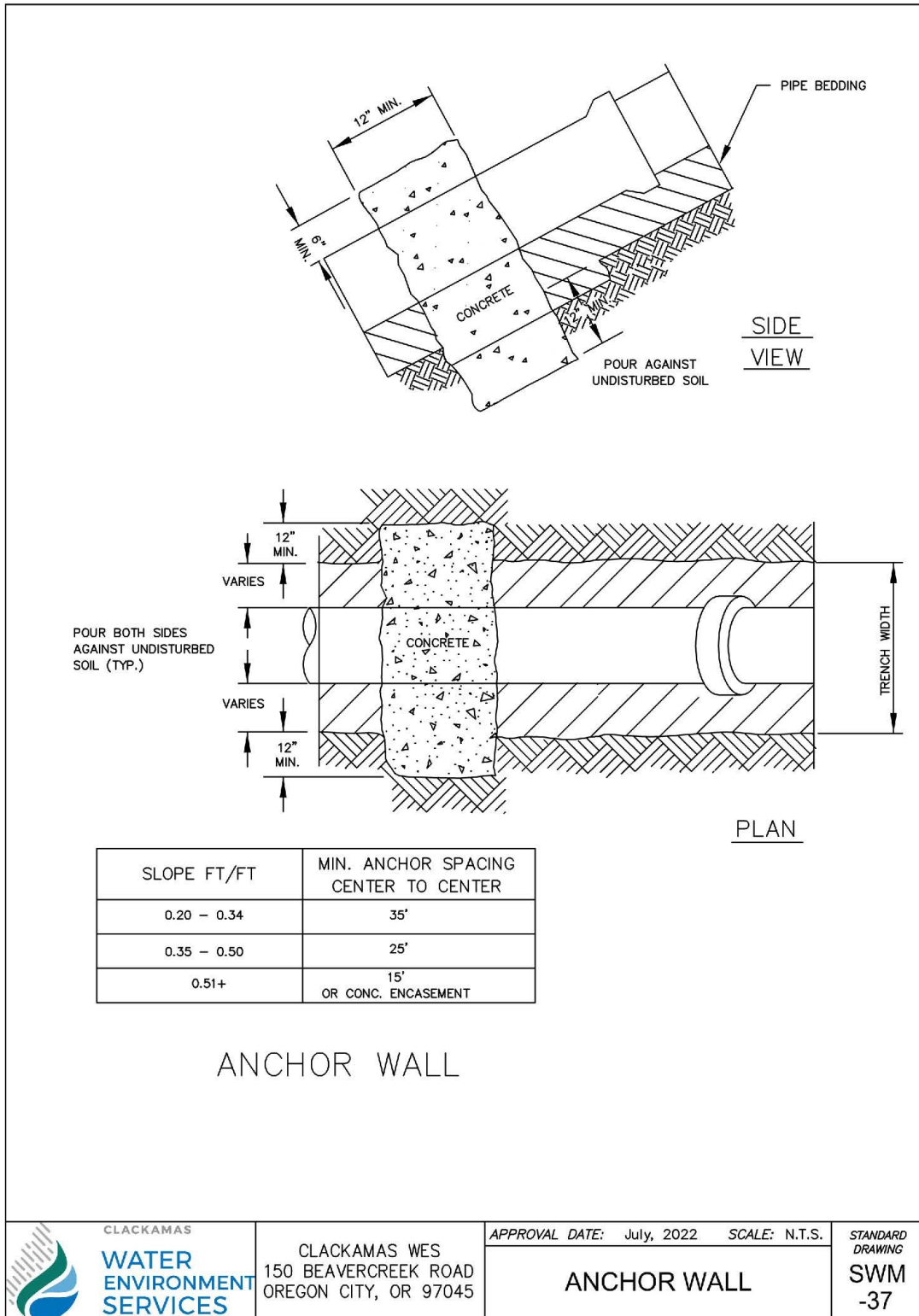


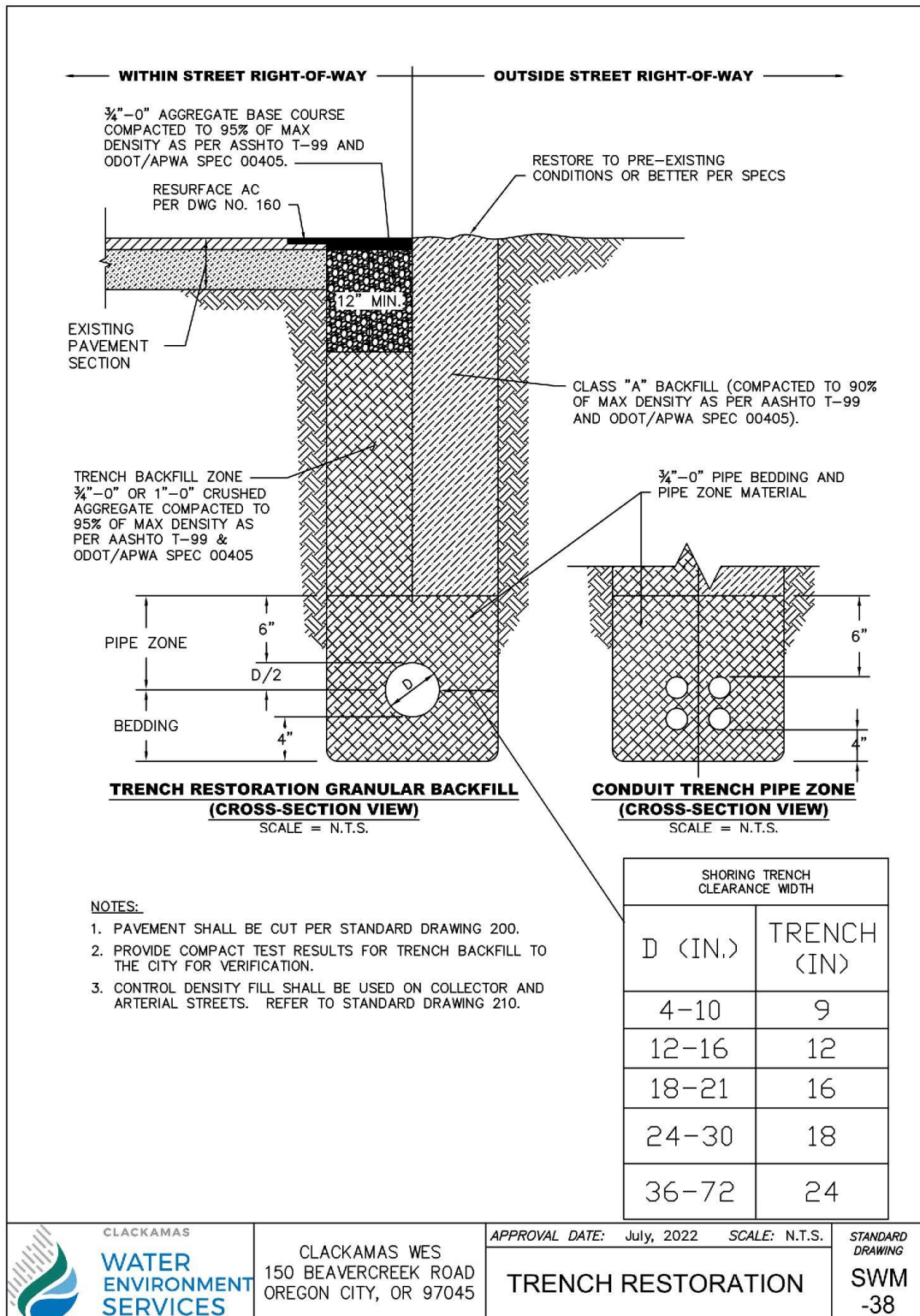










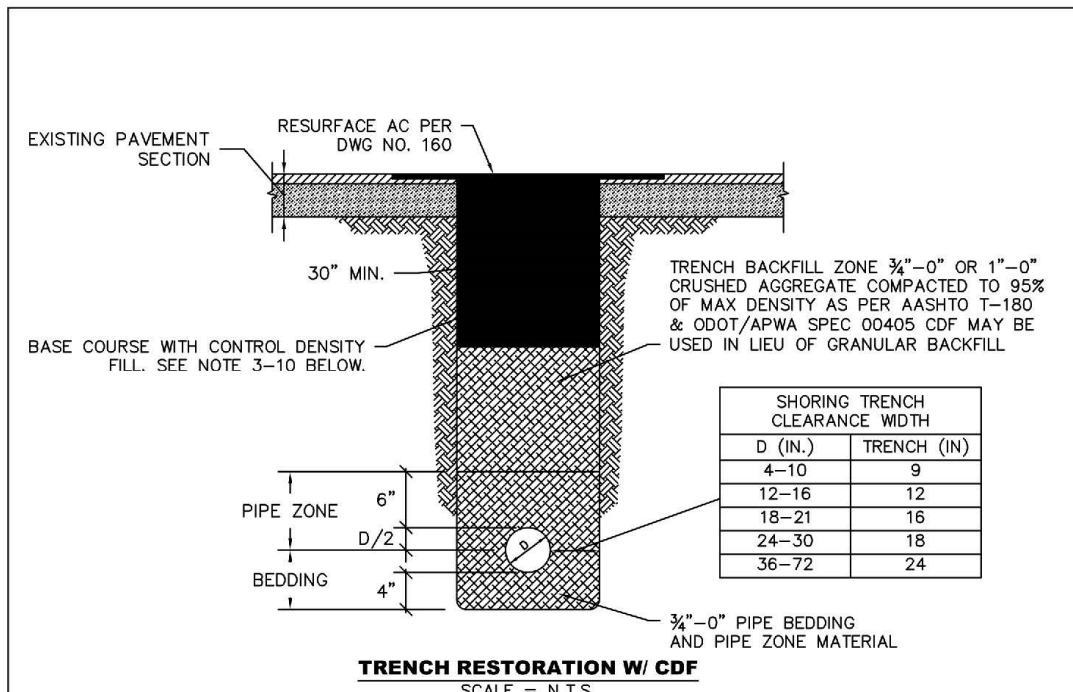


CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

APPROVAL DATE: July, 2022 SCALE: N.T.S.

TRENCH RESTORATION

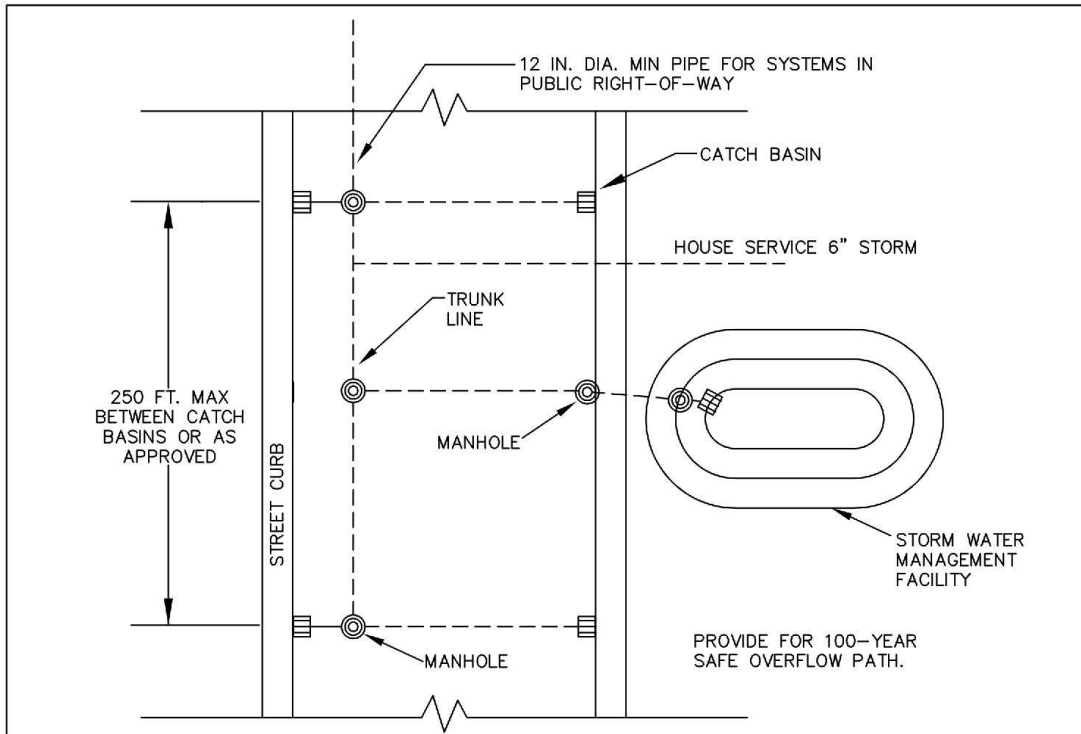
STANDARD DRAWING
SWM -38



NOTES:

- SAWCUT EXISTING AC PAVEMENT ACCORDING TO STANDARD DRAWING 200.
- CONTROL DENSITY FILL (CDF) CONSISTS OF A MIXTURE OF PORTLAND CEMENT, FLY ASH, AGGREGATES, WATER AND ADMIXTURES PROPORTIONED TO PROVIDE A NON-SEGREGATING, SELF-CONSOLIDATING, FREE-FLOWING MATERIAL WHICH WILL RESULT IN A HARDENED, DENSE, NON-SETTLING FILL PRODUCING UNCONFINED COMPRESSIVE 28 DAY STRENGTH FROM 100 PSI TO A MAXIMUM OF 200 PSI.
- CONTRACTOR WILL PROVIDE BATCH WEIGHTS SHOWING THE AMOUNTS OF ALL INGREDIENTS IN THE MIX, BATCH TIME, AND THE TOTAL AMOUNT OF THE BATCH.
- CDF SHALL BE PERFORMANCE BASED AND MEET THE FOLLOWING CRITERIA:
 - TYPE F FLY ASH: 200 LB MIN, TYPE I OR II CEMENT: 50 LB MIN
 - SETTLING SHALL BE LESS THAN 1/8" PER FT DEPTH
 - FINE AGGREGATE (LESS THAN 3/8") SHALL BE USED
 - CONCRETE UNIT WEIGHT SHALL BE 100 PCF MIN
- CDF SHALL NOT BE PLACED ON FROZEN GROUND. DURING PLACEMENT TEMPERATURE MUST BE AT LEAST **34 DEGREES F. AND RISING**. CDF PLACING SHALL STOP WHEN TEMPERATURE IS 38 DEGREES F OR LESS AND FALLING.
- TRENCH SECTIONS TO BE FILLED WITH CDF SHALL BE CONTAINED AT EITHER END OF THE TRENCH SECTION BY BULKHEADS OR EARTH FILL.
- DURING CDF CURE TIME (TYP. 48 HOURS) THE CONTRACTOR SHALL INSTALL STEEL SHEETS OR OTHER PROTECTIVE DEVICES TO ALLOW FOR THE PASSAGE AND SAFETY OF TRAFFIC AND SO NO LOAD IS TRANSFERRED TO THE CDF.
- CONTRACTOR SHALL ALLOW FOR A MINIMUM 48 HOUR CURE TIME FOR CDF PRIOR TO PLACING ASPHALT. STEEL PLATES ARE NOT ALLOWED IN THE ROADWAY JANUARY THRU MARCH, NOVEMBER AND DECEMBER WITHOUT PRIOR APPROVAL FROM THE CITY.
- 30 INCH DEPTH OF CDF MAY BE REDUCED IF CONFLICTING WITH PIPE ZONE BACKFILL.
- COPIES OF CDF MATERIAL DELIVERY SLIPS SHALL BE SUBMITTED TO CITY ENGINEERING WITHIN 48-HOURS OF PLACEMENT.


<p>CLACKAMAS WATER ENVIRONMENT SERVICES</p>	<p>CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045</p>	<p>APPROVAL DATE: July, 2022 SCALE: N.T.S.</p>	<p>STANDARD DRAWING</p>
		<p>TRENCH RESTORATION WITH CDF</p>	

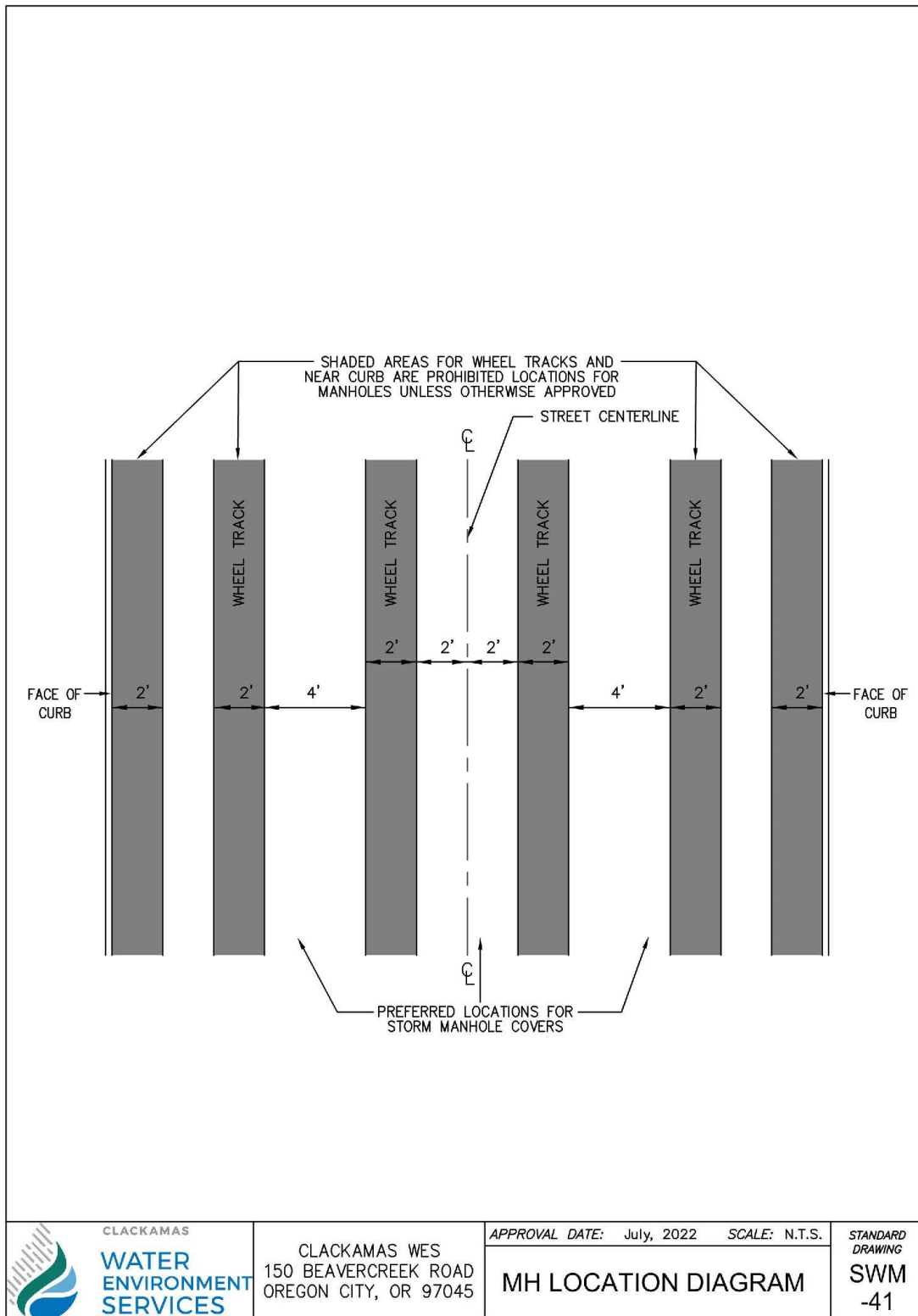


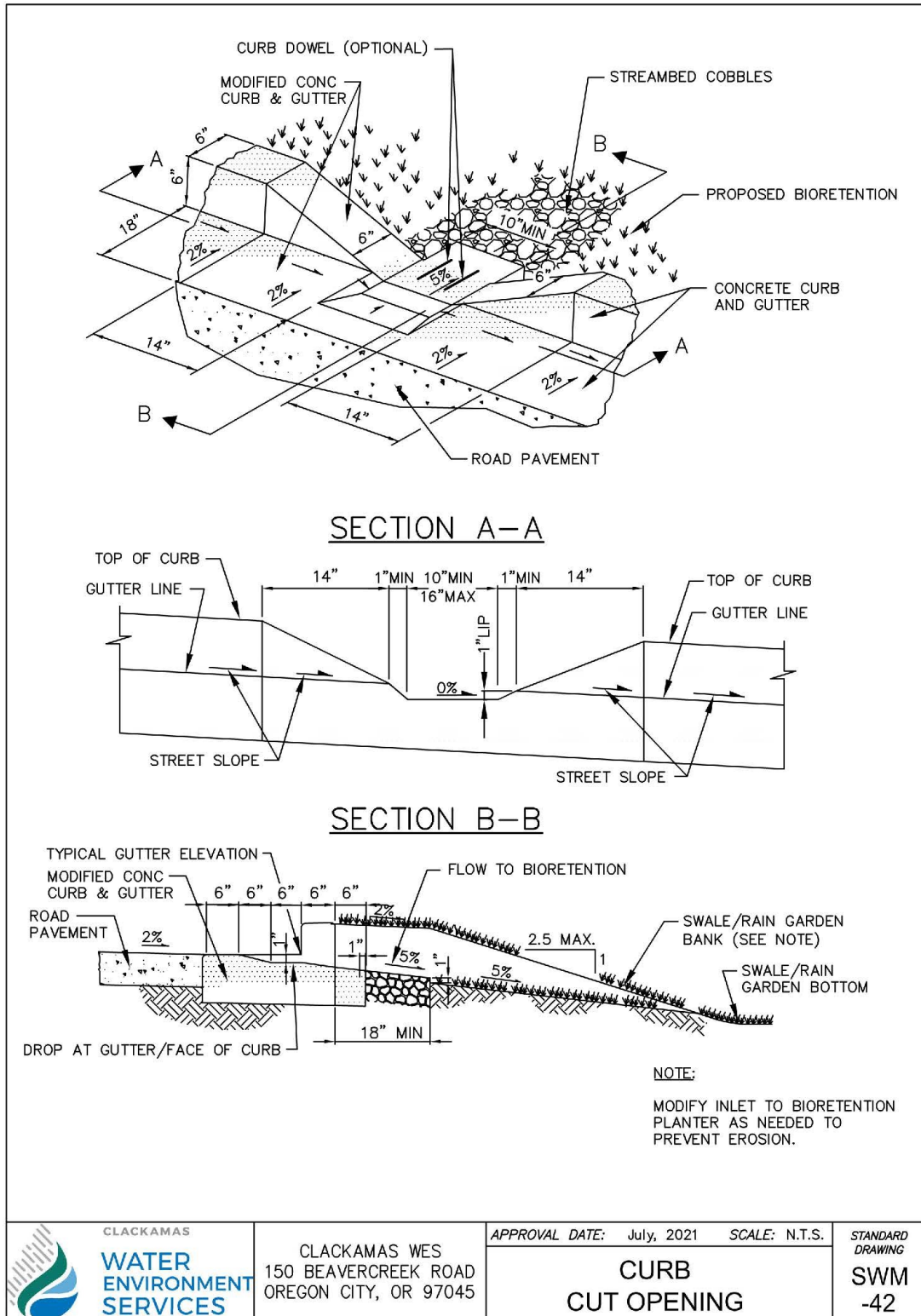
STORM COLLECTION			
STORM COLLECTION	MAX. DISTANCE BETWEEN M.H.	MIN. VELOCITY	MIN. GRADE
12-INCH PIPE	250-400 FEET	4 FT/SEC	.01 SLOPE
	0-250 FEET	3 FT/SEC	.005 SLOPE
15-INCH PIPE	250-400 FEET	4 FT/SEC	.006 SLOPE
	0-250 FEET	3 FT/SEC	.004 SLOPE
18-INCH PIPE	250-400 FEET	4 FT/SEC	.005 SLOPE
	0-250 FEET	3 FT/SEC	.003 SLOPE
24-INCH PIPE	300 FEET	3 FT/SEC	.002 SLOPE
30-INCH PIPE	300 FEET	3 FT/SEC	.002 SLOPE
36-INCH PIPE	300 FEET	3 FT/SEC	.002 SLOPE

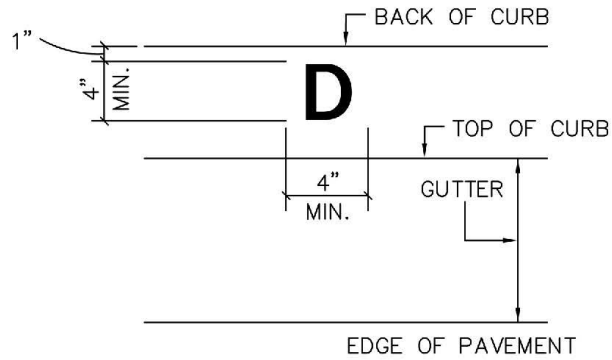
NOTES

1. A MAXIMUM OF THREE CATCH BASINS MAY BE ALLOWED TO BE CONNECTED TOGETHER WITHOUT A MANHOLE AS APPROVED BY THE DISTRICT.
2. DETENTION/WATER QUALITY FACILITIES SHALL CONNECT TO A STRUCTURE.
3. MINIMUM VELOCITY IS 3 FT/SEC.

 <p>CLACKAMAS WATER ENVIRONMENT SERVICES</p>	<p>CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045</p>	<p>APPROVAL DATE: July, 2022 SCALE: N.T.S.</p>	<p>STANDARD DRAWING</p>
		<p>COLLECTION SYSTEM DIAGRAM</p>	








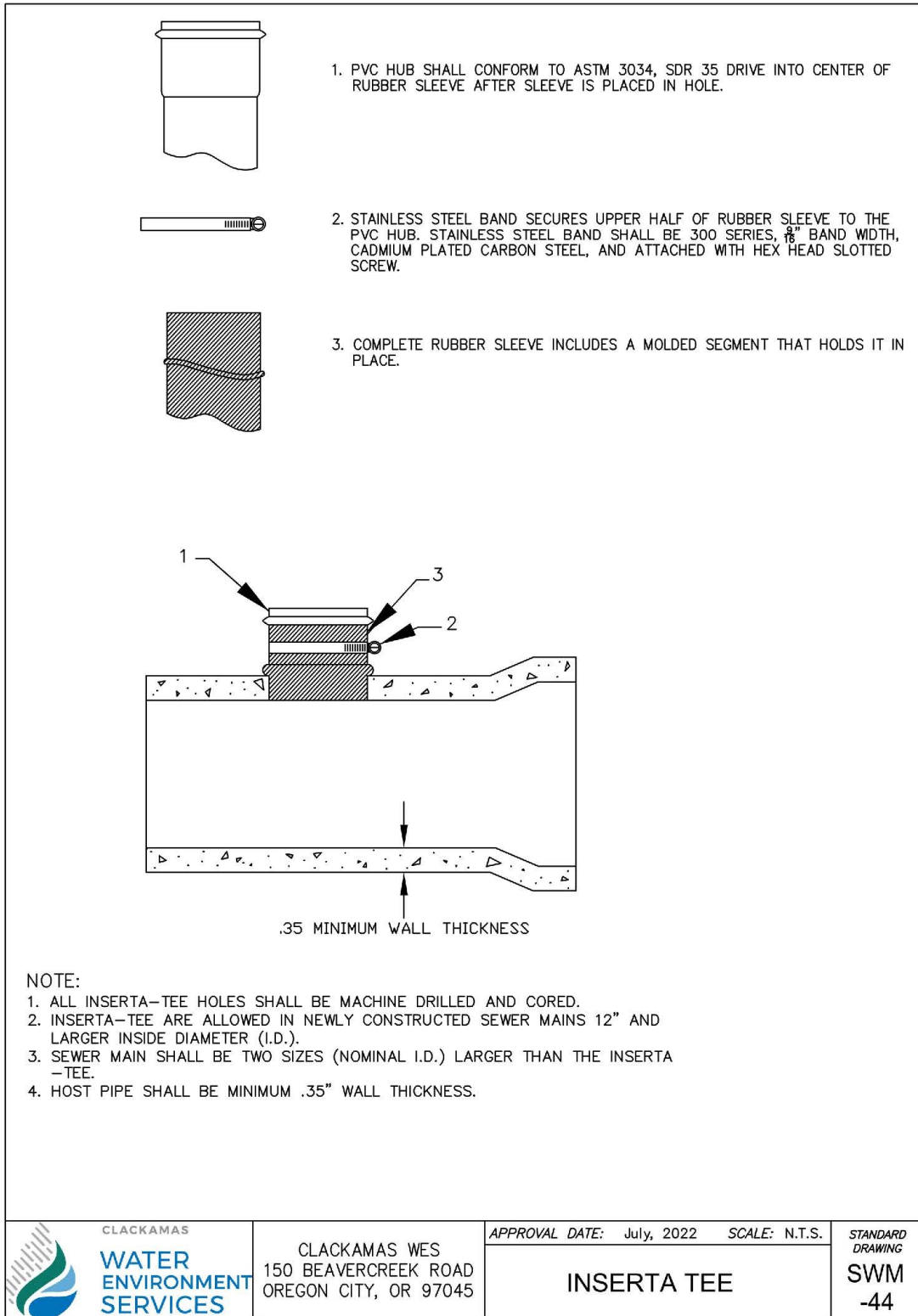
PLAN VIEW
(TYPICAL)

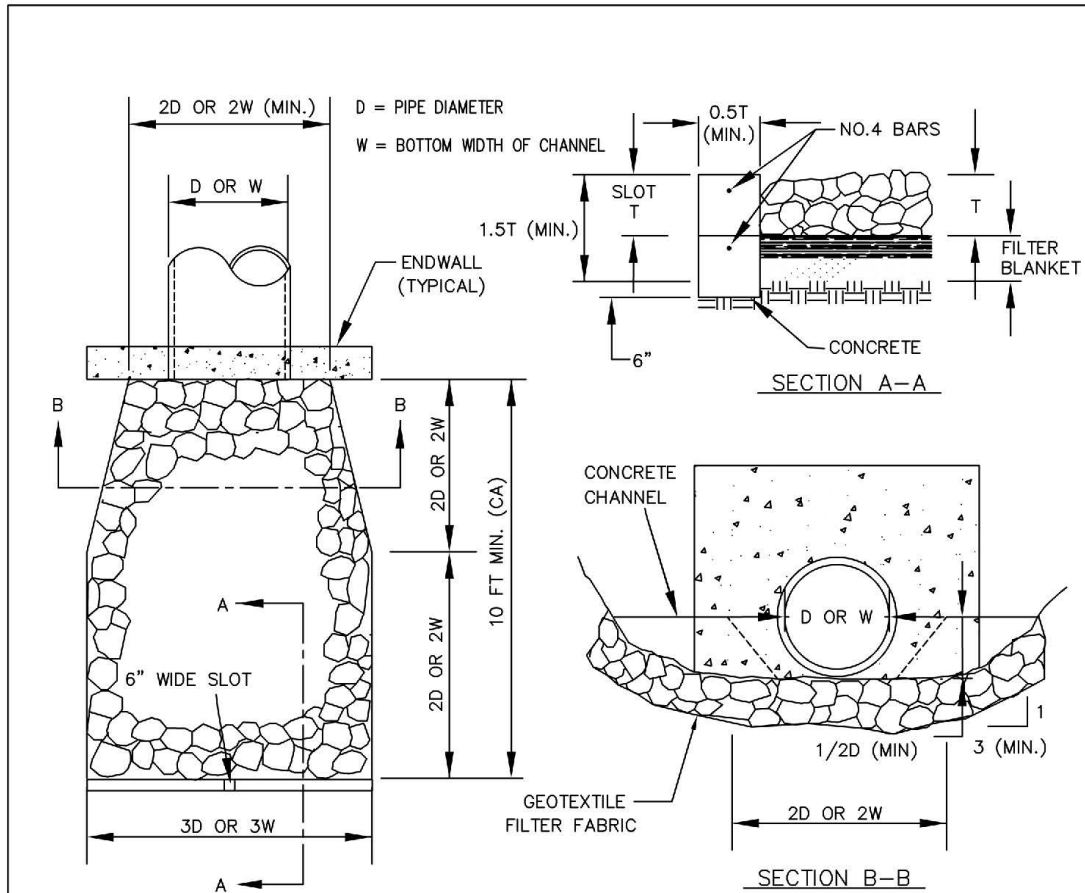
NOTES:

1. ALL STORM AND SANITARY SERVICE LATERALS SHALL BE MARKED APPROXIMATELY AS FOLLOWS:

 STORM DRAIN LATERAL "D" TOP OF CURB
 SANITARY SEWER LATERAL "S" TOP OF CURB
2. LETTERS SHALL HAVE A 1/2" MAX. WIDTH.


 CLACKAMAS WATER ENVIRONMENT SERVICES	CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045	APPROVAL DATE: July, 2022 SCALE: N.T.S.	STANDARD DRAWING
		CURB STAMP DETAIL	





NOTES

1. PLANS SHALL SPECIFY:
 - A) ROCK CLASS AND THICKNESS (T)
 - B) FILTER MATERIAL, NUMBER OF LAYERS AND THICKNESS.
2. RIP RAP SHALL BE EITHER QUARRY STONE OR BROKEN CONCRETE (IF SHOWN ON THE PLANS). COBBLES ARE NOT ACCEPTABLE. SEE DETAIL SWM ST-10.1 FOR SIZING.
3. RAP RAP SHALL BE PLACED OVER FILTER BLANKET WHICH MAY BE EITHER GRANULAR MATERIAL OR PLASTIC FILTER CLOTH.
4. PLACEMENT
 - A) MINIMUM DEPTH = 1-1/2 TIMES AVERAGE STONE SIZE.
 - B) ROCKS SHALL BE PLACED TO PROVIDE A MINIMUM OF VOIDS.
 - C) SURFACE ROCKS SHALL PROTRUDE AT LEAST 1/2 THEIR VERTICAL DIMENSION.
 - D) RIPRAP IS TO BE PLACED OVER A GEOTEXTILE FABRIC ON A NATURAL BEDDING, OR IT MAY BE GROUTED OR PLACED OVER A GRAVEL BEDDING AS REQUIRED BY THE DISTRICT.

 <p>CLACKAMAS WATER ENVIRONMENT SERVICES</p>	<p>CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045</p>	APPROVAL DATE: July, 2021 SCALE: N.T.S.	STANDARD DRAWING
		OUTFALL RIP RAP	

RIP RAP SIZING AT OUTFALLS FOR PIPES GREATER THAN 6 INCHES IN DIAMETER

DISCHARGE VELOCITY AT DESIGN FLOW (FPS)	REQUIRED PROTECTION MINIMUM DIMENSIONS				
	TYPE	DEPTH*	WIDTH	LENGTH**	WIDTH
0 - 5	RIPRAP*	2 X (MAX STONE SIZE)	DIAMETER +6 FEET	10' MIN. OR AS CALCULATED IF LONGER	CROWN +1 FOOT
6 - 10	RIPRAP*	2 X (MAX STONE SIZE)	DIAMETER +6 FEET OR 3 X DIA. WHICH EVER IS GREATER	AS CALCULATED	CROWN +1 FOOT
11 - 20	GABION OR RIPRAP*	2 X (MAX STONE SIZE)	DIAMETER +6 FEET OR 4 X DIA. WHICH EVER IS GREATER	AS CALCULATED	CROWN +1 FOOT
OVER 20	ENGINEERED ENERGY DISSIPATER REQUIRED				

* RIPRAP SIZE SHALL BE DETERMINED USING THE FOLLOWING FORMULAE***

- V = AVERAGE VELOCITY (FT/S)
- Do = PIPE DIAMETER (FT)
- ds = RIPRAP DIAMETER (FT)
- Lsp = APRON LENGTH (FT)
- depth = THICKNESS (FT)
- Fo = $V / (g \cdot D_o)^{0.5}$

- *RIPRAP SIZE $ds = 0.25 \cdot D_o \cdot F_o$ (6" MINIMUM)
- DEPTH = $2 \cdot ds$ (1-FOOT MINIMUM)
- **APRON LENGTH $L_{sp} = D_o(8 + 17 \cdot \log F_o)$

$g = 32.2 \text{ FT/S}^2$

*** US ARMY CORPS OF ENGINEER DESIGN FORMULAS FROM EROSION AND RIPRAP REQUIREMENTS AT CULVERT AND STORM OUTLETS, JANUARY 1970.



CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

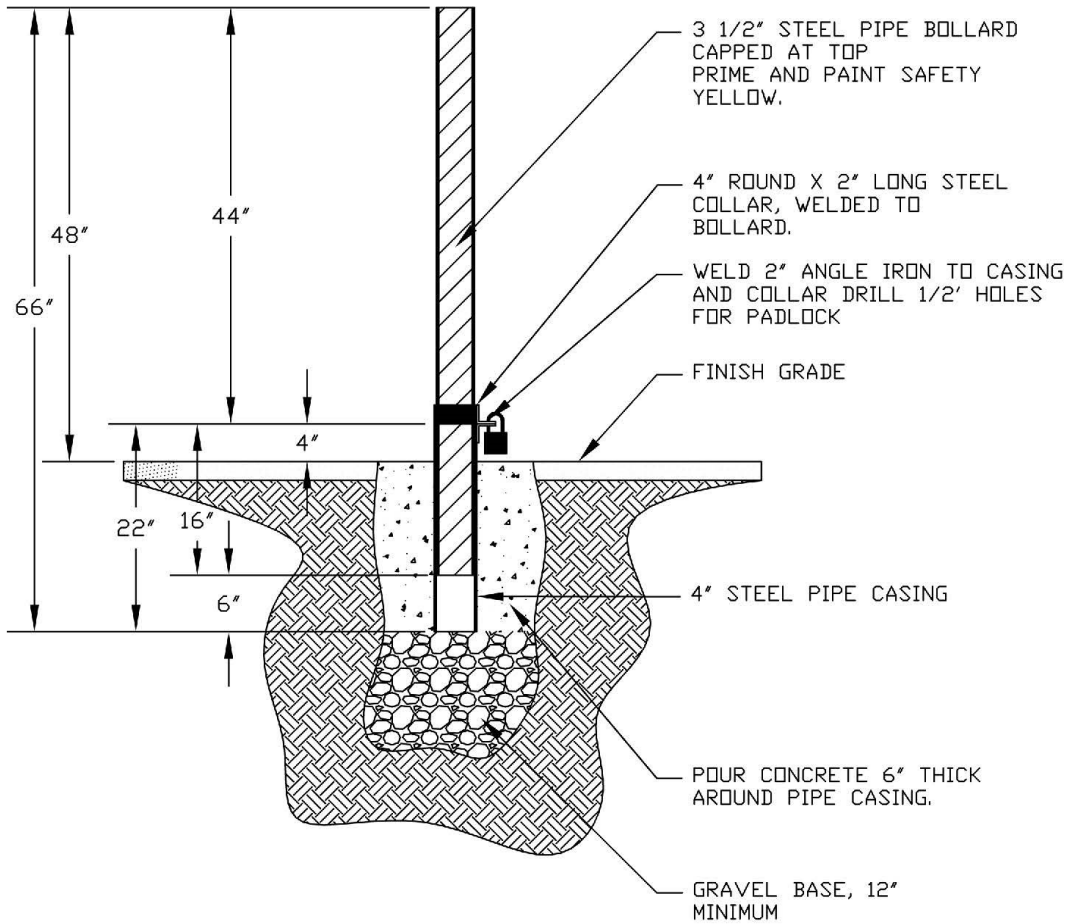
APPROVAL DATE: July, 2022 SCALE: N.T.S.

OUTFALL RIP RAP SIZING

STANDARD DRAWING
SWM
-46

STEEL PIPE SPECIFICATIONS

ASTM A-53 STEEL, SCHEDULE 40, BLACK, HOT DIPPED, ZINC-COATED, WELDED, SEAMLESS
 4-INCH STEEL PIPE O.D. = 4.500" I.D. = 4.026" THICKNESS = 0.237"
 3 1/2-INCH STEEL PIPE O.D. = 4.000" I.D. = 3.549" THICKNESS = 0.226"

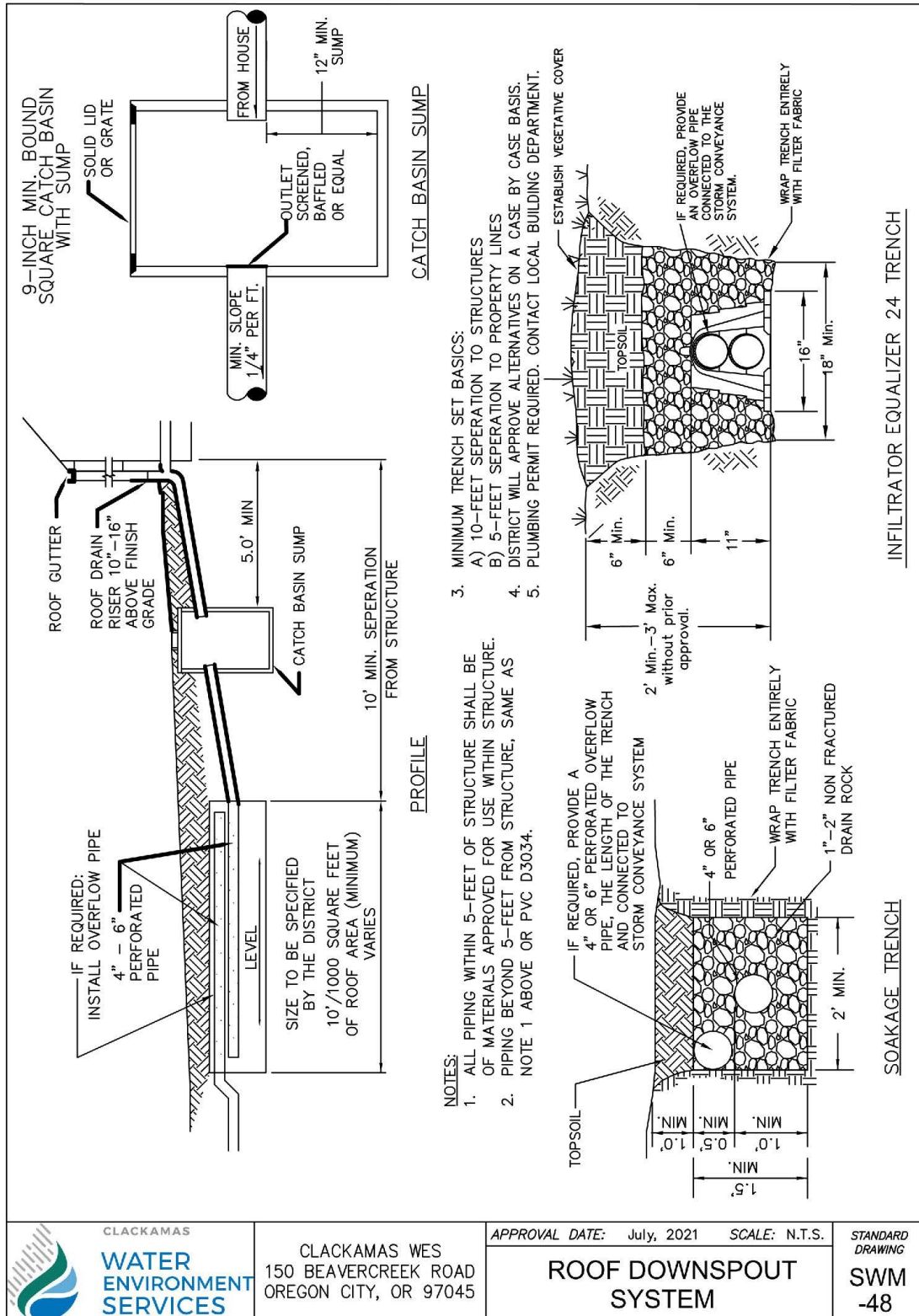


CLACKAMAS WES
 150 BEAVERCREEK ROAD
 OREGON CITY, OR 97045

APPROVAL DATE: July, 2022 SCALE: N.T.S.

REMOVABLE BOLLARD

STANDARD DRAWING
SWM
 -47

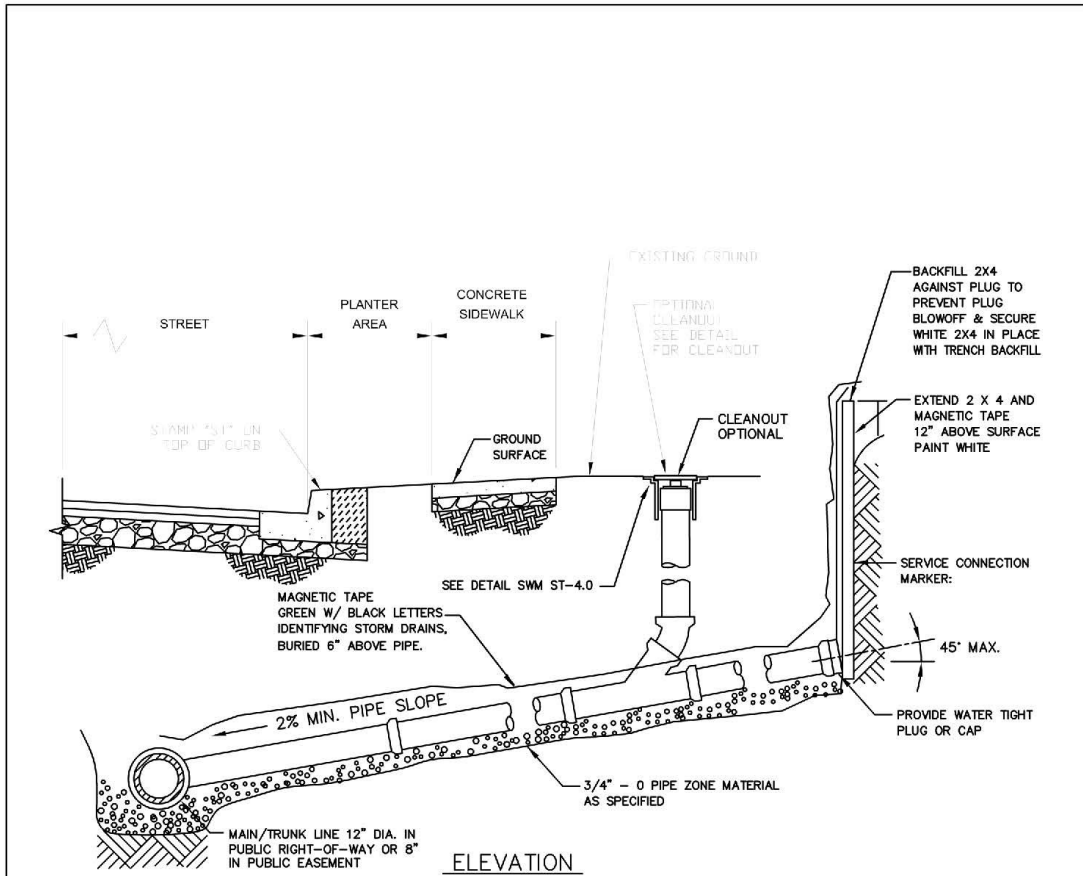


CLACKAMAS WES
150 BEAVERCREEK ROAD
OREGON CITY, OR 97045

APPROVAL DATE: July, 2021 SCALE: N.T.S.


ROOF DOWNSPOUT SYSTEM

STANDARD DRAWING
SWM -48



STORM SEWER LATERAL SERVICE CONNECTION

NOTE: EVERY PROPERTY SHALL HAVE A SEPARATE SERVICE CONNECTION CONNECTED DIRECTLY TO THE MAINLINE, UNLESS OTHERWISE APPROVED BY THE DISTRICT. SHARED SERVICES ARE NOT ALLOWED.

 <p>CLACKAMAS WATER ENVIRONMENT SERVICES</p>	<p>CLACKAMAS WES 150 BEAVERCREEK ROAD OREGON CITY, OR 97045</p>	<p>APPROVAL DATE: July, 2022 SCALE: N.T.S.</p>	<p>STANDARD DRAWING SWM -49</p>
		<p>SERVICE CONNECTION</p>	