BACKFILL MATERIAL SPECIFICATIONS

GRAVEL FOR SUBBASE: GRAVEL FOR SUBBASE SHALL BE OBTAINED FROM APPROVED SOURCES. IT SHALL CONSIST OF SATISFACTORILY GRADED, FREE DRAINING GRANULAR MATERIAL REASONABLY FREE FROM LOAM, SILT, CLAY AND ORGANIC MATERIAL. MAXIMUM STONE SIZE IS 8".

GRADING: THE GRAVEL SHALL MEET THE REQUIREMENTS OF THE FOLLOWING TABLE:

✱ TABLE 704.04A – GRAVEL FOR SUBBASE

SIEVE DESIGNATION	PERCENTAGE BY MASS (WEIGHT) PASSING SQUARE MESH SIEVES
NO. 4	20 TO 60
NO. 100	0 TO 12
NO. 200	0 TO 6

CRUSHED GRAVEL FOR SUBBASE: CRUSHED GRAVEL FOR SUBBASE SHALL BE PRODUCED FROM NATURAL GRAVELS OR CRUSHED QUARRIED ROCK AND SHALL BE A MATERIAL REASONABLY FREE FROM SILT, LOAM, CLAY OR ORGANIC MATTER. IT SHALL BE OBTAINED FROM APPROVED SOURCES AND SHALL MEET THE FOLLOWING REQUIREMENTS:

GRADING: THE CRUSHED GRAVEL SHALL BE UNIFORMLY GRADED FROM COARSE TO FINE AND SHALL MEET THE REQUIREMENTS OF THE FOLLOWING TABLE:

TABLE 704.05A – CRUSHED GRAVEL FOR SUBBASE

GRADING	SIEVE DESIGNATION	PERCENTAGE BY MASS (WEIGHT) PASSING SQUARE MESH SIEVES
FINE	2 INCH	100
	1–1/2 INCH	90 TO 100
	NO. 4	30 TO 60
	NO. 100	0 TO 12
	NO. 200	0 TO 6

SAND BORROW AND CUSHION: SAND BORROW AND SAND CUSHION SHALL CONSIST OF MATERIAL REASONABLY FREE FROM SILT, LOAM, CLAY OR ORGANIC MATTER. IT SHALL BE OBTAINED FROM APPROVED SOURCES AND SHALL MEET THE REQUIREMENTS OF THE FOLLOWING TABLE:

✱ TABLE 703.03A – SAND BORROW AND CUSHION

SIEVE DESIGNATION	PERCENTAGE BY MASS (WEIGHT) PASSING SQUARE MESH SIEVES
50 MM (2 INCH)	100
37.5 MM (1–1/2 INCH)	90 TO 100
12.5 MM (1/2 INCH)	70 TO 100
4.75 MM (NO. 4)	60 TO 100
150 UM (NO. 100)	0 TO 20
75 UM (NO. 200)	0 TO 8

GRANULAR BORROW: GRANULAR BORROW SHALL BE OBTAINED FROM APPROVED SOURCES, CONSISTING OF STONE AND SAND REASONABLY FREE FROM LOAM, SILT, CLAY AND ORGANIC MATERIAL AND SHALL MEET THE REQUIREMENTS OF THE FOLLOWING TABLE:

✱ TABLE 703.04A – GRANULAR BORROW

SIEVE DESIGNATION	PERCENTAGE BY MASS (WEIGHT) PASSING SQUARE MESH SIEVES
4.75 MM (NO. 4)	20 TO 100
75 UM (NO. 200)	0 TO 12

THE MAXIMUM SIZE OF STONE PARTICLES IN THE GRANULAR BORROW SHALL NOT EXCEED 67 PERCENT OF THE THICKNESS OF THE LAYER BEING SPREAD.

GRANULAR BACKFILL FOR STRUCTURES: GRANULAR BACKFILL FOR STRUCTURES SHALL BE OBTAINED FROM APPROVED SOURCES. IT SHALL CONSIST OF SATISFACTORILY GRADED, FREE DRAINING GRANULAR MATERIAL REASONABLY FREE FROM LOAM, SILT, CLAY AND ORGANIC MATERIAL. THE GRANULAR BACKFILL SHALL MEET THE REQUIREMENTS SPECIFIED IN THE FOLLOWING TABLE:

✱ TABLE 704.08A – GRANULAR BACKFILL FOR STRUCTURES

SIEVE DESIGNATION	PERCENTAGE BY MASS (WEIGHT) PASSING SQUARE MESH SIEVES
75 MM (3 INCH)	100
4.75 MM (NO. 4)	45 TO 75
150 UM (NO. 100)	0 TO 12
75 UM (NO. 200)	0 TO 6

TESTING SEWER MANHOLES

A. EACH MANHOLE SHALL BE TESTED BY MEANS OF A WATER TEST OR VACUUM TEST. IN ANY CASE, THERE SHALL BE BE NO VISIBLE LEAKAGE INTO THE BASE OR WALLS OF A COMPLETED MANHOLE.

B. AFTER THE MANHOLE HAS BEEN ASSEMBLED IN PLACE, ALL LIFTING HOLES AND THOSE EXTERIOR JOINTS WITHIN 6 FEET OF THE GROUND SURFACE SHALL BE FILLED AND POINTED WITH AN APPROVED NON–SHRINKING MORTAR. THE TEST SHALL BE MADE PRIOR TO PLACING THE SHELF AND INVERT. IF THE GROUNDWATER TABLE HAS BEEN ALLOWED TO RISE ABOVE THE BOTTOM OF THE MANHOLE, THE ENGINEER MAY SHIFT THE TEST TO SUBSEQUENT TO THE PLACING OF THE INVERT. ALL PIPES AND OTHER OPENINGS INTO THE MANHOLE SHALL BE SUITABLY PLUGGED AND THE PLUGS BRACED TO PREVENT BLOWOUT.

C. IF THE CONTRACTOR ELECTS TO BACKFILL PRIOR TO WATER TESTING, FOR ANY REASON, IT SHALL BE AT HIS OWN RISK AND IT SHALL BE INCUMBENT UPON THE CONTRACTOR TO DETERMINE THE REASON FOR ANY FAILURE OF THE TEST. NO ADJUSTMENT IN THE LEAKAGE ALLOWANCE WILL BE MADE FOR UNKNOWN CAUSES SUCH AS LEAKAGE OF PLUGS, ABSORPTION, ETC. I.E., IT WILL BE ASSUMED THAT ALL LOSS OF WATER DURING THE TEST IS A RESULTS OF LEAKS THROUGH THE JOINTS OR THROUGH THE CONCRETE. FURTHERMORE, THE CONTRACTOR SHALL TAKE ANY STEPS NECESSARY TO ASSURE THE ENGINEER THAT THE WATER TABLE IS BELOW THE BOTTOM OF THE MANHOLE THROUGHOUT THE TEST.

D. IF THE GROUNDWATER TABLE IS ABOVE THE HIGHEST JOINT IN THE MANHOLE, AND IF THERE IS NO LEAKAGE INTO THE MANHOLE AS DETERMINED BY THE ENGINEER, SUCH A TEST CAN BE USED TO EVALUATE THE WATER TIGHTNESS OF THE MANHOLE, HOWEVER, IF THE ENGINEER IS NOT SATISFIED, THE CONTRACTOR SHALL LOWER THE WATER TABLE AND CARRY OUT THE TEST AS DESCRIBED HEREINBEFORE.

E. WATER TEST: THE MANHOLE SHALL THEN BE FILLED WITH WATER TO THE TOP OF THE CONE SECTION. A PERIOD OF ONE HOUR WILL BE PERMITTED, TO ALLOW FOR ABSORPTION. AT THE END OF THIS PERIOD, THE MANHOLE SHALL BE REFILLED TO THE TOP OF THE CONE, AND THE LEAKAGE TAKEN FROM THE MEASURING BARREL FOR A PERIOD OF AT LEAST 1 HOUR. THE LEAKAGE IN THE MANHOLE SHALL BE REDUCED TO A SATISFACTORY RATE BY THE USE OF THE MEASURING BARREL. WATER ADDED TO THE MANHOLE SHALL BE CONTROLLED TO A 24 HOUR RATE AND THE LEAKAGE DETERMINED ON THE BASIS OF DEPTH. THE LEAKAGE FOR EACH MANHOLE SHALL NOT EXCEED ONE GALLON PER VERTICAL FOOT FOR A 24 HOUR PERIOD. REPAIRS BY APPROVED METHODS MAY BE MADE, AS DIRECTED BY THE ENGINEER, TO BRING THE LEAKAGE WITHIN ALLOWABLE RATE OF ONE GALLON PER FOOT PER DAY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO UNCOVER THE MANHOLE, AS NECESSARY, AND TO DISASSEMBLE, RECONSTRUCT OR REPLACE IT AS DIRECTED BY THE ENGINEER. THE MANHOLE SHALL THEN BE RETESTED.

F. VACUUM TEST: THE CONTRACTOR SHALL FURNISH THE MANHOLE CONE SEAL, VACUUM PUMP, ALL NECESSARY GAUGES, HOSES, AND EQUIPMENT TO PERFORM THE TEST.

G. FILL ALL LIFTING HOLES AND EXTERIOR JOINTS WITH APPROVED NON–SHRINKING MORTAR AND PLUG ALL OTHER OPENINGS INTO THE MANHOLE TO PREVENT DISPLACEMENT.

H. INSTALL AN INFLATABLE RUBBER RING THE SIZE OF THE TOP OF THE MANHOLE BY INFLATING THE RING WITH AIR, TO A PRESSURE ADEQUATE TO PREVENT LEAKAGE OF AIR BETWEEN THE RING AND THE MANHOLE WALL.

I. PUMP THE AIR OUT OF THE MANHOLE THROUGH AN OPENING IN THE TEST PLATE UNTIL A VACUUM IS CREATED INSIDE THE MANHOLE EQUAL TO 10 INCHES OF MERCURY USING AN APPROVED VACUUM GAUGE. THEN STOP THE REMOVAL OF AIR AND BEGIN THE TEST.

J. THE VACUUM CAN NOT DROP BELOW 9 INCHES OF MERCURY WITHIN A 2 MINUTE TEST PERIOD. IF MORE THAN A 1 INCH DROP OCCURS WITHIN 2 MINUTES, THE MANHOLE HAS FAILED THE TEST, AND IT SHALL BE REPAIRED OR RECONSTRUCTED AND THEN RETESTED UNTIL IT PASSES AT NO EXPENSE TO OWNER.

K. BACKFILL AROUND THE MANHOLE UPON SATISFACTORY TEST RESULTS.

TESTING SEWERS

A. TEST THE GRAVITY SEWER BY A PRESSURIZED AIR TEST BETWEEN CONSECUTIVE MANHOLES. PLUG THE TWO ENDS OF THE PIPE AND CONNECT THE AIR CONTROL EQUIPMENT TO THE TAPPED END.

B. SUPPLY AIR SLOWLY TO THE PIPE UNTIL REACHING A CONSTANT PRESSURE OF 3.5 PSI, THROTTLE THE AIR SUPPLY SO THAT THE PRESSURE REMAINS ABOVE 3.0 PSI FOR AT LEAST 5 MINUTES TO ALLOW TEMPERATURE STABILIZATION IN THE PIPE. MONITOR PRESSURE WITH A GAUGE HAVING A RANGE FROM 0 TO 5 PSI . THE GAUGE SHOULD HAVE MINIMUM DIVISIONS OF 0.1 PSI AND AN ACCURACY OF +– 0.04 PSI. REGULATE THE AIR PRESSURE TO PREVENT IT FROM EXCEEDING 5.0 PSI.

C. AFTER STABILIZATION, ADJUST PRESSURE TO 3.5 PSI AND SHUT OFF AIR SUPPLY. WHEN THE PRESSURE REACHES 3.0 PSI START THE STOP WATCH AND RECORD THE TIME IT TAKES TO REACH 2.5 PSI. THE TIME REQUIRED FOR THE PIPE SIZE MUST BE AT LEAST:

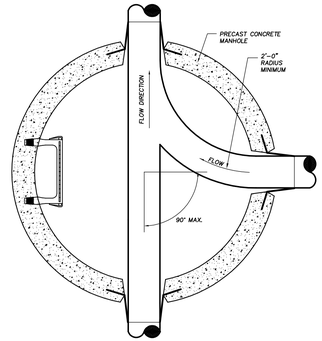
PIPE DIAMETER	MINUTES	SECONDS	PIPE DIAMETER	MINUTES	SECONDS
4"	2	33	15"	9	35
6"	3	50	18"	11	34
8"	5	06	20"	12	45
10"	6	22	21"	13	30
12"	7	39			

D. IF LATERALS ARE INCLUDED IN THE TESTING, THE AVERAGE OF THE PIPES (USING DIAMETER AND LENGTH) WILL BE CALCULATED AND MULTIPLIED BY 38.2 SECONDS PER INCH DIAMETER TO OBTAIN THE REQUIRED TIME.

E. IF THERE IS GROUND WATER ABOVE THE SEWER LINE THE AIR TEST PRESSURE WILL BE INCREASED BY 0.5 PSI FOR EACH FOOT OF WATER ABOVE THE INVERT OF THE PIPE. DIFFERENCES DUE TO AIR TEMPERATURE AND BAROMETRIC PRESSURE WILL BE CONSIDERED NEGLIGIBLE.

F. IF THE TEST TIME IS LESS THAN THAT REQUIRED IN THE ABOVE TABLE, THE PIPE WILL HAVE FAILED AND ADEQUATE REPAIRS AND RETESTING WILL BE REQUIRED AT NO EXPENSE TO OWNER.

G. FOR 8" AND SMALLER PIPES: IF DURING THE 5 MINUTE SATURATION PERIOD, THE PRESSURE DROP IS LESS THAN 0.5 PSI AFTER THE INITIAL STABILIZATION AND AIR HAS NOT BEEN ADDED, THE PIPE SECTION UNDERGOING THE TEST SHALL HAVE PASSED.



MANHOLE CHANNEL
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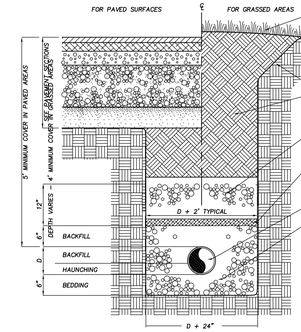
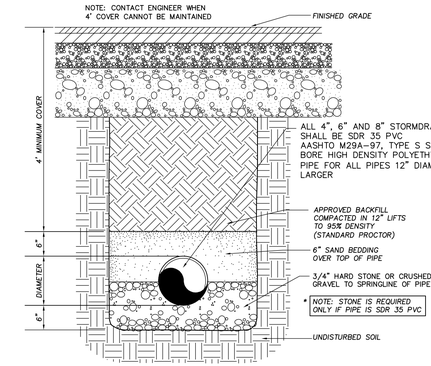


TYPICAL SEWER TRENCH
NTS



TYPICAL STORMDRAIN TRENCH
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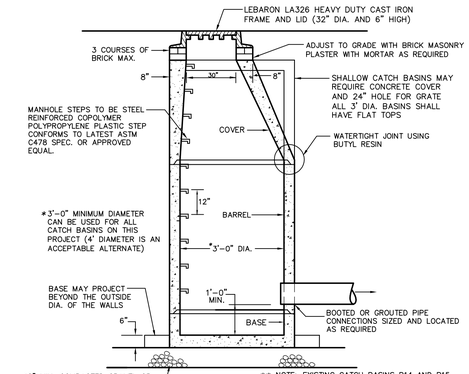

** TYPICAL CATCH BASIN
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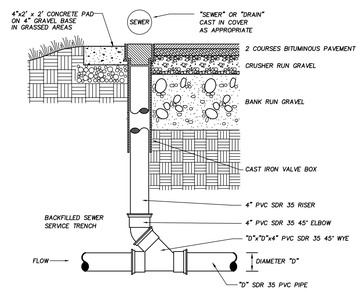

TYPICAL SEWER CLEANOUT
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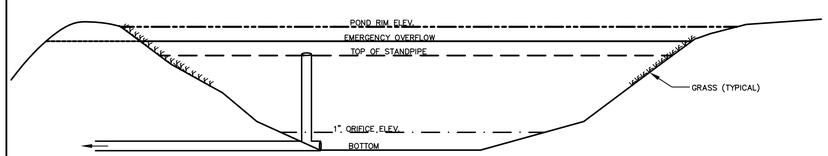

STORMWATER WET POND DETAIL
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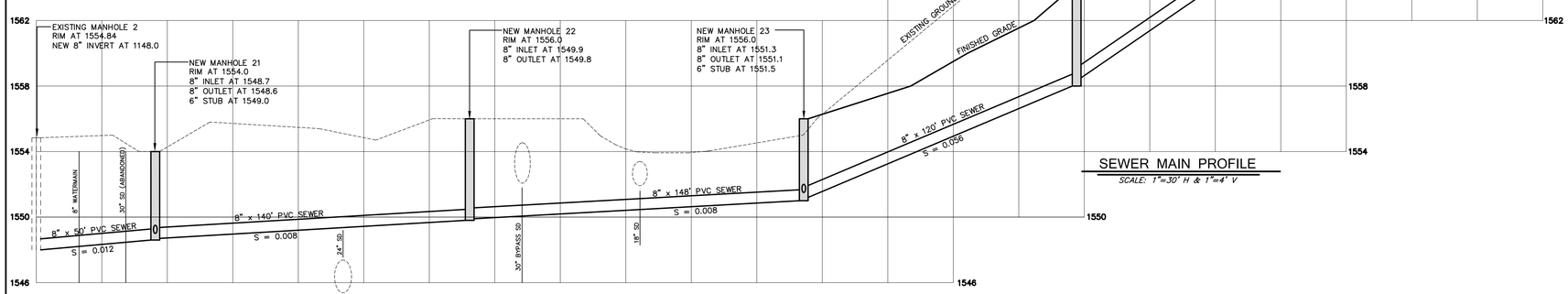
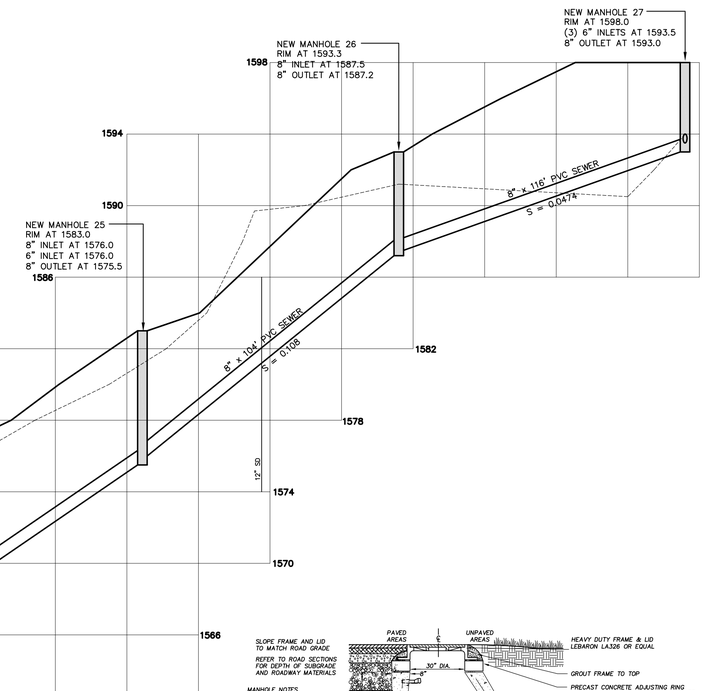
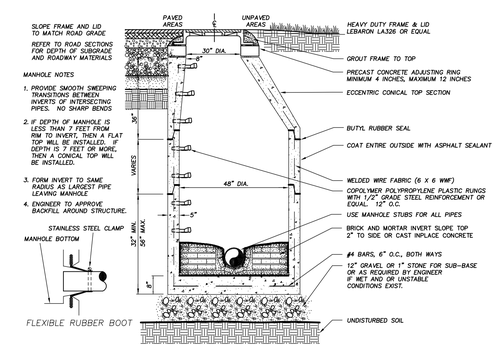
POND #	POND BOTTOM	1" ORIFICE	TOP OF RISER STANDPIPE	EMEGENCY OVERFLOW	TOP BERM	FOREBAY OVERFLOW	DRAIN SIZE
ENLARGED 8A	1546.0	1549.5	1550.5	✱ 1552.0	1554.0	1554.0	8"
NEW 8B	1555.0	1558.0	1560.0	1561.0	1562.5	1561.0	12"

✱ RIM OF CATCH BASIN #5A AT 1552.0



SEWER MAIN PROFILE
SCALE: 1"=30' H & 1"=4' V





TYPICAL SEWER MANHOLE with 30" COVER
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REVISIONS

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SEWER PROFILE & DETAILS

S2