

ORDINANCE 2020-05

AN ORDINANCE OF NORTH OGDEN CITY AMENDING THE ZONING ORDINANCE OF NORTH OGDEN CITY TO ADOPT LOW IMPACT DESIGN STANDARDS IN ALL ZONES

- WHEREAS;** New regulations from the State of Utah require that cities adopt low impact design standards; and
- WHEREAS;** These regulations apply to projects that are greater than one acre in size and that increase the amount of impervious area by 10% or more; and
- WHEREAS;** The standards allow for design options to meet the standards; and
- WHEREAS;** The General Plan goals support the reasonable use of property while maintaining high quality design standards; and
- WHEREAS;** The North Ogden City Planning Commission has reviewed these standards and conducted a public hearing on the amendment and recommends adoption of this amendment.

NOW THEREFORE, BE IT ORDAINED by the North Ogden City Council that the North Ogden City zoning ordinance 11-10-38 Street Standards and 11-10-39 Low Impact Development (LID) Standards are established, and 11-7C-6 Street Standards is deleted.

SECTION 1: Text to be added:

Define Infill, max street frontage, size of parcel, perimeter

11-10-38: STREET STANDARDS

For all development, Standard Street Cross sections must be installed; but may be adjusted if a low impact development design is included within the public right-of-way of the project which allows for the onsite retention of the 80% storm, as approved by the City Engineer. If low impact development design is employed the following modifications maybe allowed:

- A. Street right of way width: 60 feet or more, but in no case less than 48 feet when applied to “infill” projects as approved by the Planning Commission.
- B. Street pavement width back of curb to back of curb (TBC – TBC) 41 feet or more, but in no case less than 32 feet.

11-10-39: LOW IMPACT DEVELOPMENT (LID) STANDARDS

- A. The General Permit for Discharges from Small Municipal Separate Storm Sewer Systems (MS4s), UPDES Permit No.UTR090000 (Permit), was reissued in 2016 with a new storm water retention requirement. Effective March 1, 2020, Permit Part 4.2.5.3.4 requires new development or redevelopment projects that disturb greater than or equal to one acre and that increase the amount of impervious area by 10% or more, including projects less than one acre that are part of a larger common plan of development or sale to manage rainfall on-site, and prevent the off-site discharge of the precipitation from all rainfall events less than or equal to the 80th percentile rainfall event. This permit requirement is to be accomplished through the use of Low Impact Development (LID) and Green Infrastructure (GI) practices that are designed, constructed, and maintained to infiltrate, evapotranspire and/or harvest and reuse.
- B. Engineers and designers can choose LID/GI techniques/options, contained in the Public Works Standards and Standard Drawings, to infiltrate evapotranspire and/or harvest and reuse the runoff generated.

- C. Projects shall use the Utah Guide to Low Impact Development developed by the Utah Department of Environmental Quality, Division of Water Quality, as a reference and guide for incorporating low impact development (LID) storm water approaches into new development and redevelopment projects.
- D. Goals of LID:
1. Mimic natural processes
 2. Promote infiltration, evapotranspiration, harvest/reuse
 3. Manage storm water close to source
 4. LID design planning at the project conception
 5. Promote and preserve open spaces and natural vegetation
 6. Help meet density goals by specifying building footprint, height limits, and setbacks that allow for the proper placement of LID BMPs
 7. Include an LID analysis as part of the site plan review
 8. Allow for the use of pervious surfaces within parking lots
 9. Encourage clustering development to increase green space within developments
 10. Address any public safety concerns relating to LID practices
 11. Allow vegetation appropriate to the BMP being used
 12. Address maintenance agreements that:
 - a. Determine final ownership of the BMP (if not the MS4)
 - b. Require a maintenance schedule, list of activities, and identify the responsible party
 - c. Allow the municipality to access BMPs for inspections and/or maintenance
 - d. Provide a method of resolution should violation of the maintenance agreement occur

SECTION 2: Text to be deleted.

11-7C-6: STREET STANDARDS

The Standard Street cross section must be installed unless a low impact development design reduces the storm water runoff to 85% or less of the standard right of way width runoff as approved by the city engineer. If low impact development design is employed the following modifications are allowed:

- A. Street right of way width: 48 feet or more
- B. Street pavement width: 32 feet or more

SECTION 3. The Public Works Standards are hereby amended to incorporate the attached Standard Drawings as found in Exhibit A.

SECTION 4: This ordinance shall take effect upon adoption.

PASSED and ADOPTED this 10th day of March 2020.

North Ogden City:



S. Neal Berube
North Ogden City Mayor

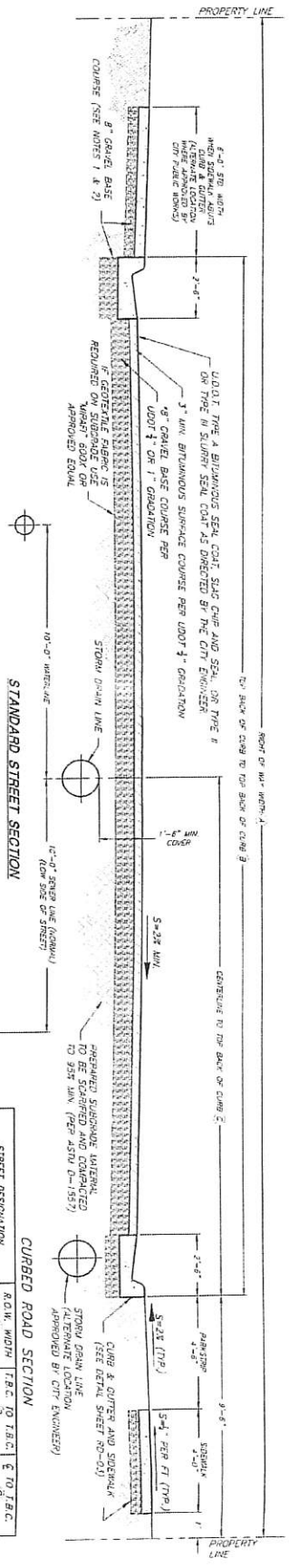
CITY COUNCIL VOTE AS RECORDED:

	Aye	Nay
Council Member Barker:	<u>X</u>	___
Council Member Cevering:	<u>X</u>	___
Council Member Ekstrom:	<u>X</u>	___
Council Member Stoker:	<u>X</u>	___
Council Member Swanson:	<u>X</u>	___
(In event of a tie vote of the Council):		
Mayor Berube	___	___

ATTEST:



S. Annette Spendlove
S. Annette Spendlove, MMC
City Recorder



STREET SECTION NOTES

1. PROVIDE 4" THICKNESS OF 3/4" OR 1" GRAVEL BASE COURSE UNDER SIDEWALK.
2. PROVIDE 8" THICKNESS OF 3/4" OR 1" GRAVEL BASE COURSE UNDER DRIVEWAY APPROACHES AND CURBS & GUTTERS.
3. *THICKNESS OF GRAVEL BASE COURSE SHALL BE CONSIDERED AS CITY STANDARD AND MAY BE INCREASED BY THE CITY ENGINEER WHEN A GREATER DEPTH IS NECESSARY TO PROVIDE SUFFICIENT STABILITY. DESIGN AND/OR DEVELOPER MAY SUBMIT AN ALTERNATIVE DESIGN BASED ON A DETAILED SOIL ANALYSIS AND T1, TRAFFIC INDEX, FOR APPROVAL BY THE CITY ENGINEER. APPROVED ALTERNATIVE DESIGN SHALL BE LESS THAN 3" AND GRAVEL BASE COURSE LESS THAN 8" THICK.
4. SOFT COMPACTED FROST-FREE FILL SHALL BE EQUAL TO THE SIDEWALK WIDTH AND ONE FOURTH OF CONCRETE THICKNESS FOR CONSTRUCTION ZONING IN QUALITY ZONING SHALL NOT EXCEED TEN FEET.
5. PROVIDE 1/2" EXPANSION MATERIAL AT 60" INTERVALS AND AT ALL EDGES WHERE SIDEWALKS ADJUT DRIVEWAYS. EXPANSION MATERIAL TO EXTEND THE ENTIRE THICKNESS OF THE CONCRETE.
6. IN NEW SITUATIONS WHERE FUTURE DRIVEWAY LOCATIONS ARE UNKNOWN, THE DRIVEWAY APPROACH SHALL BE MADE BY SAW CUTTING THE BACK OF THE EXISTING CURB TO THE REQUIRED DIMENSION WIDTH. ALL SAW CUTTING SHALL BE ACCOMPLISHED BY A CITY APPROVED LICENSED CONTRACTOR.
7. SIDEWALK ADDITIONS TO DRIVE APPROACHES MUST BE 6" MINIMUM THICKNESS THROUGH THE DRIVEWAY WIDTH.
8. IF THE SIDEWALK HAS BEEN PREVIOUSLY INSTALLED WITHIN THE NEW DRIVEWAY, IT IS CONSIDERED THE 4" THICK SIDEWALK AND GRAVEL BASE SHALL BE REMOVED AND REPLACED WITH 8" THICK SIDEWALK AND 8" THICK GRAVEL BASE THROUGH THE DRIVEWAY OR DEVELOPER'S EXPENSE.
9. PARKING SPACES TO ACCOMMODATE UTILITY MAINTENANCE SHALL BE CONSTRUCTED OF SEPARATE MATERIAL SUCH AS CONCRETE, ASPHALT OR POLYMER CONCRETE. PARKING SPACES ARE NOT ALLOWED IN PARKING SPACES AND PROTECTIVE CURBS SHALL BE PROVIDED. PARKING SPACES SHALL BE 8' WIDE AND 20' LONG. PARKING SPACES SHALL BE 8' WIDE AND 20' LONG. PARKING SPACES SHALL BE 8' WIDE AND 20' LONG.
10. ALL CURBS, WATER MAINS AND SERVICES MUST MAINTAIN A MINIMUM SEPARATION FROM ALL SERVICES MAINS AND LATERALS OF 10'-0" HORIZONTAL AND 18" VERTICALLY ABOVE N. ACCORDANCE WITH THE STATE OF UTAH DIVISION OF PLANNING WHEN RULES SECTION R301-530-7.
11. MANUAL GAS TRIPPLET LOCATED IN THE PARALLEL POWER AND COMMUNICATION LINES TRIPPLET LOCATED BEHIND PROPERTY LINES OR IN LOT EASEMENTS.

STREET CUTS AND POST-TENSIONING ACTIVITIES

1. WHEN AN EXISTING ROADWAY IS CUT FOR THE LOCATION OR INSTALLATION OF UTILITY LINES THE CONTRACTOR SHALL BE RESPONSIBLE WITH A 1'-0" PATCH AS SHOWN ON THE TYPICAL SECTION LOCATION PROCEDURES. THE PATCH SHALL BE FILLED WITH AGRICULTURAL SOIL AND FINISHED TO MATCH THE EXISTING ROADWAY SURFACE. THE PATCH SHALL BE 1'-0" WIDE AND 1'-0" LONG. THE PATCH SHALL BE 1'-0" WIDE AND 1'-0" LONG.
2. WHEN AN EXISTING ROADWAY IS CUT FOR THE LOCATION OR INSTALLATION OF UTILITY LINES THE CONTRACTOR SHALL BE RESPONSIBLE WITH A 1'-0" PATCH AS SHOWN ON THE TYPICAL SECTION LOCATION PROCEDURES. THE PATCH SHALL BE FILLED WITH AGRICULTURAL SOIL AND FINISHED TO MATCH THE EXISTING ROADWAY SURFACE. THE PATCH SHALL BE 1'-0" WIDE AND 1'-0" LONG. THE PATCH SHALL BE 1'-0" WIDE AND 1'-0" LONG.

GENERAL NOTES

1. ALL OTHER PROPOSED STREET CROSS SECTIONS SHALL BE AS APPROVED BY THE NORTH SLOPE CITY ENGINEER & PLANNING COMMISSION.
2. ROAD SECTION USED AS DETERMINED BY THE CITY ENGINEER & PLANNING COMMISSION. ROAD SECTION USED AS DETERMINED BY THE CITY ENGINEER & PLANNING COMMISSION.

STREET DESIGNATION	R.O.W. WIDTH	T.B.C. TO T.B.C.	€ TO T.B.C.
MAJOR (STANDARD RESIDENTIAL)	60'	41'	20.5'
COLLECTOR	66'	47'	21.5'
MAJOR ARTERIAL	100'	65'	32.5'
MAJOR ARTERIAL	120'	81'	40.5'

CHOWN LOCATION FOR VARIOUS CROSS SLOPES

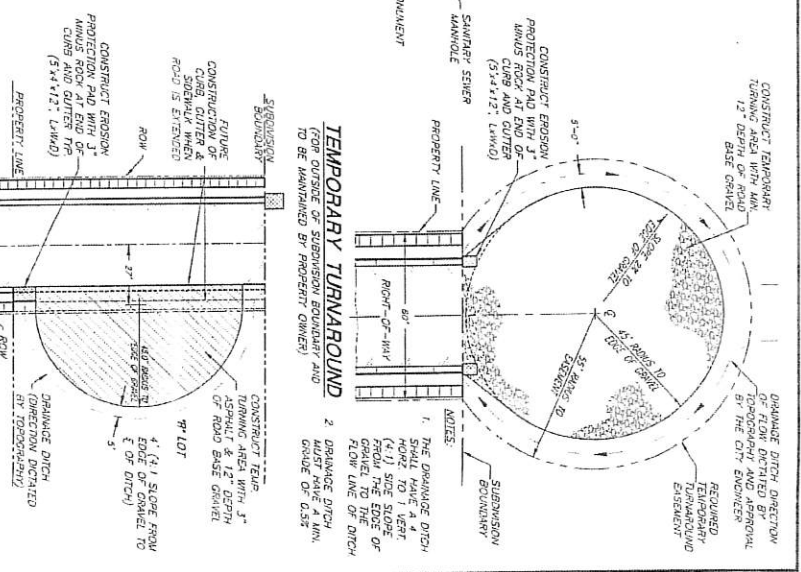
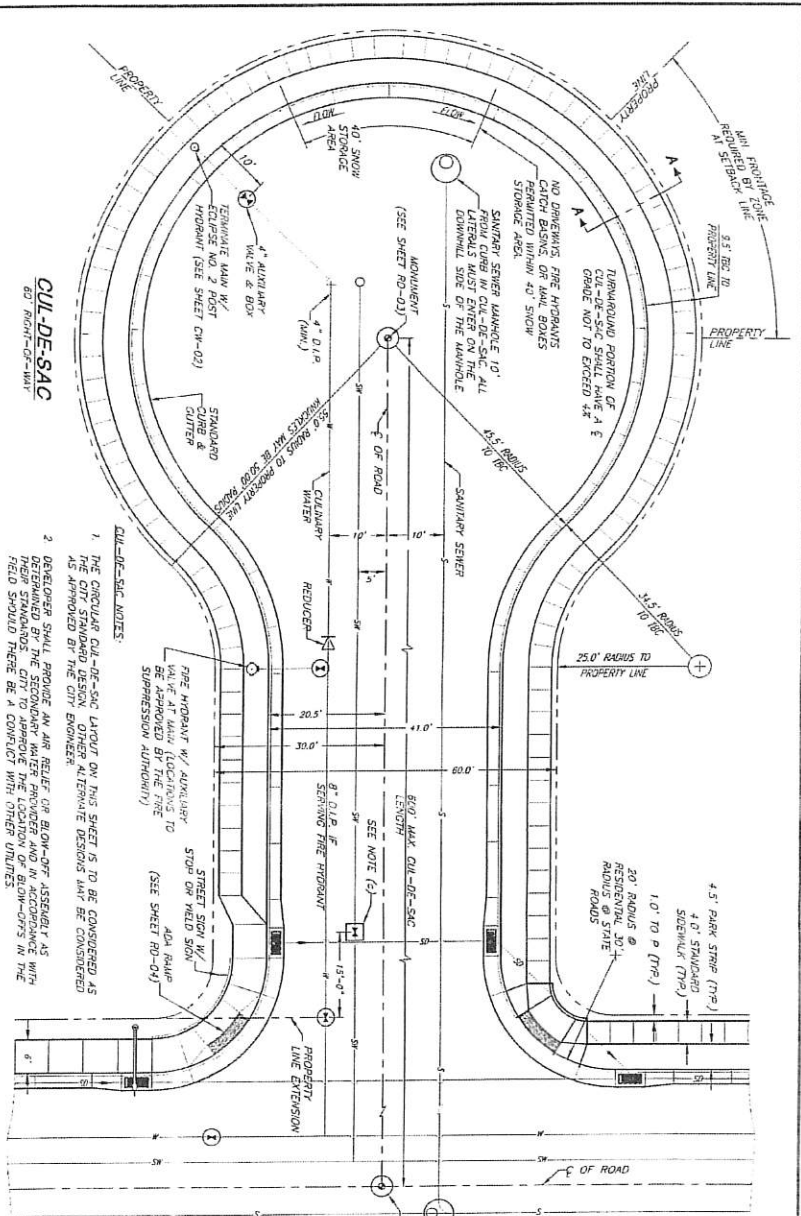
CROWN LOCATION	€ TO T.B.C.
41'-0"	18'-0"
47'-0"	12'-0"
47'-0"	18'-0"
65'-0"	21'-0"
65'-0"	18'-0"
81'-0"	18'-0"
81'-0"	18'-0"

CONSULTING ENGINEERS
 6000 Foothill Park Drive
 South Ogden, Utah 84403 (801) 478-3187

PUBLIC ROADS - TYPICAL STREET SECTION

NORTH SLOPE CITY CORPORATION
 PUBLIC WORKS STANDARDS

RD-01
 OF 3 SHEETS

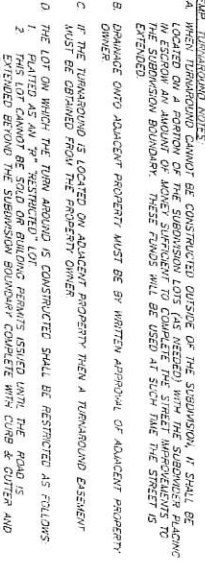
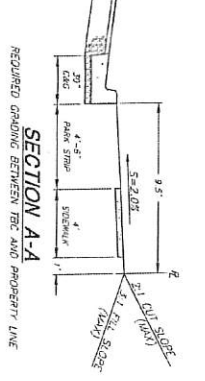
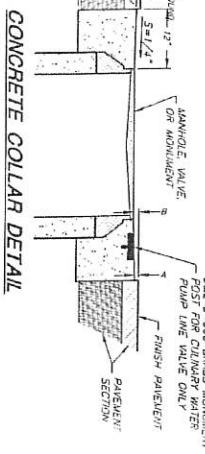


CONCRETE COLLAR NOTES:

1. ALL CONCRETE COLLARS TO BE REINFORCED WITH #4 BARS AFTER PLACING
2. ALL CONCRETE COLLARS TO BE REINFORCED WITH #4 BARS AFTER PLACING
3. ALL CONCRETE COLLARS TO BE REINFORCED WITH #4 BARS AFTER PLACING
4. ALL CONCRETE COLLARS TO BE REINFORCED WITH #4 BARS AFTER PLACING

MANHOLE PATTERNS:

DESCRIPTION	NEAR ROAD	OVERLAY
A. ASPHALT TO CONCRETE	1/2"	1/2"
B. ASPHALT TO ASP.	3/4"	1/2"



CUL-DE-SAC

1. THE CIRCULAR CUL-DE-SAC LAYOUT ON THIS SHEET IS TO BE CONSIDERED AS THE CITY STANDARD DESIGN. OTHER ALTERNATE DESIGNS MAY BE CONSIDERED AS APPROVED BY THE CITY ENGINEER.
2. DEVELOPER SHALL PROVIDE AN AIR RELIEF OR BLOW-OFF ASSEMBLY AS DETERMINED BY THE SECONDARY WATER PROVIDER AND IN ACCORDANCE WITH FIELD SURVEY THERE BE A CONFLICT WITH OTHER UTILITIES.
3. ALL TERMINATING SEWER MAINS SHALL END WITH A CITY STANDARD MANHOLE.
4. SERVICE LATERAL CONNECTIONS SHALL NOT BE ALLOWED IN SEWER MANHOLES.

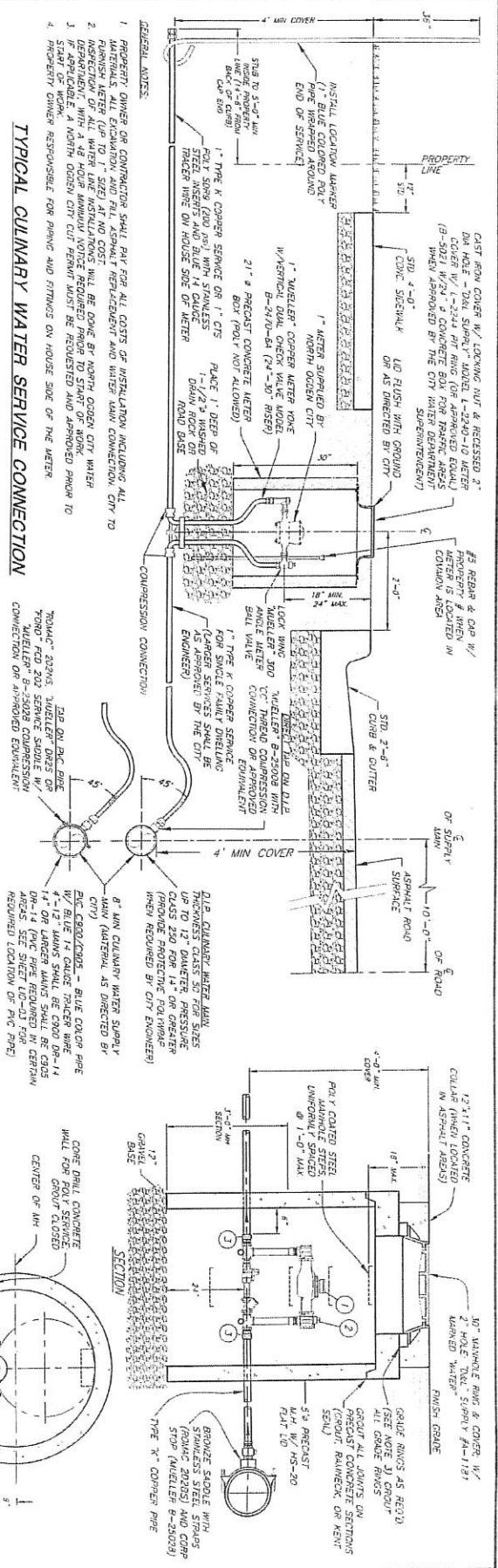
TEMPORARY TURNAROUND

1. THE DRAINAGE DITCH SHALL HAVE A 4% SLOPE TO 1' VERT. FROM THE HIGH POINT OF THE ROAD TO THE FLOW LINE OF DITCH.
2. DRAINAGE DITCH MUST HAVE A MIN. GRADE OF 0.5%.

CONSULTING ENGINEERS
JOYNS & JOYNS
 6880 Fosham Park Drive
 Suite 100, Utah 84143 (201) 478-9787

NORTH DODGE CITY CORPORATION
PUBLIC ROADS - CUL-DE-SAC & TEMP. TURNAROUND DETAILS

RD-05
 8/2008



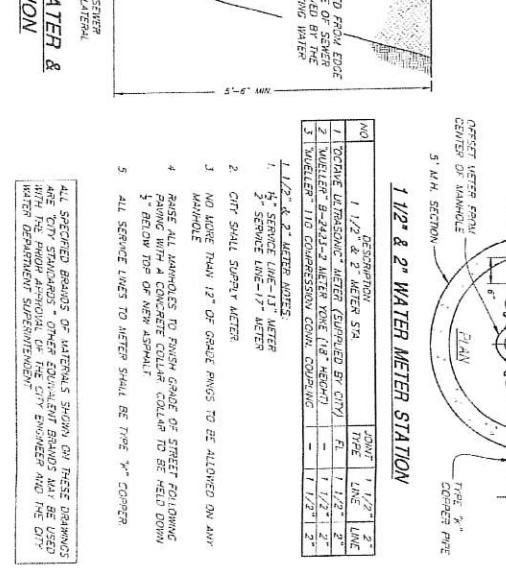
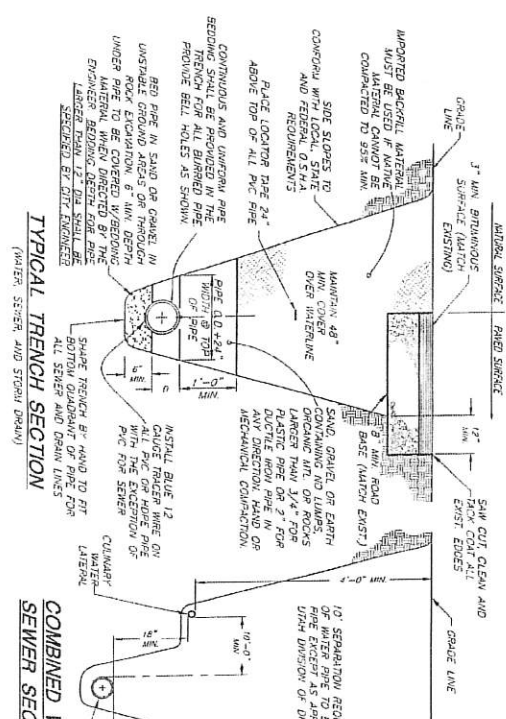
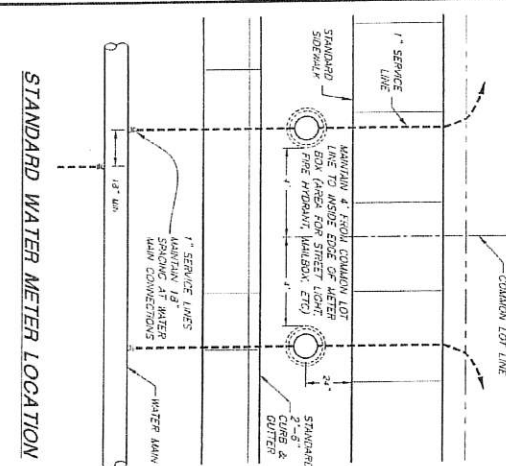
TYPICAL CULINARY WATER SERVICE CONNECTION

1. PROPERTY OWNER OR CONTRACTOR SHALL PAY FOR ALL COSTS OF INSTALLATION INCLUDING ALL MATERIALS AND LABOR.
2. INSPECTION OF ALL WATER LINE INSTALLATIONS WILL BE DONE BY NORTH CODEN CITY WATER DEPARTMENT WITH A 48 HOUR ADVANCE NOTICE REQUIRED PRIOR TO START OF WORK.
3. START OF WORK SHALL BE A NORTH CODEN CITY CUT PERMIT MUST BE OBTAINED AND APPROVED PRIOR TO START OF WORK.
4. PROPERTY OWNER RESPONSIBLE FOR PILING AND FITTINGS ON HOUSE SIDE OF THE METER.

TYPICAL TRENCH SECTION



COMBINED WATER & SEWER SECTION



NO.	DESCRIPTION	UNIT	QTY.
1	1 1/2\"/>		

1 1/2\"/>

<p>STANDARD WATER METER LOCATION</p>		<p>TYPICAL TRENCH SECTION</p>		<p>COMBINED WATER & SEWER SECTION</p>	
<p>PROPERTY OWNER OR CONTRACTOR SHALL PAY FOR ALL COSTS OF INSTALLATION INCLUDING ALL MATERIALS AND LABOR.</p>		<p>INSPECTION OF ALL WATER LINE INSTALLATIONS WILL BE DONE BY NORTH CODEN CITY WATER DEPARTMENT WITH A 48 HOUR ADVANCE NOTICE REQUIRED PRIOR TO START OF WORK.</p>		<p>START OF WORK SHALL BE A NORTH CODEN CITY CUT PERMIT MUST BE OBTAINED AND APPROVED PRIOR TO START OF WORK.</p>	
<p>PROPERTY OWNER RESPONSIBLE FOR PILING AND FITTINGS ON HOUSE SIDE OF THE METER.</p>		<p>PROPERTY OWNER RESPONSIBLE FOR PILING AND FITTINGS ON HOUSE SIDE OF THE METER.</p>		<p>PROPERTY OWNER RESPONSIBLE FOR PILING AND FITTINGS ON HOUSE SIDE OF THE METER.</p>	

NORTH CODEN CITY CORPORATION
 PUBLIC WORKS STANDARDS
 CULINARY WATER - RESIDENTIAL WATER SERVICE, 1 1/2\"/>

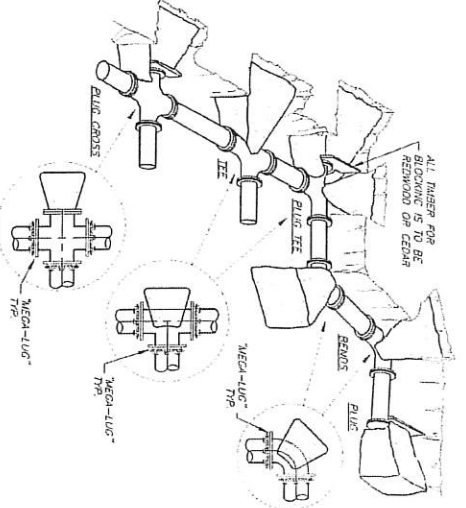
CONSULTING ENGINEERS
 TONKES & TONKES
 South Ogden, Utah 84403 (801) 476-3787

THRUST PER SQ. OF WATER PRESSURE AT VARIOUS FITTINGS	30 PSI	40 PSI	50 PSI	60 PSI	70 PSI	80 PSI	90 PSI	100 PSI
1/2" M.P. ELBOW	1.546	1.995	2.444	2.893	3.342	3.791	4.240	4.689
1/2" M.P. TEE	1.546	1.995	2.444	2.893	3.342	3.791	4.240	4.689
1/2" M.P. CROSS	1.546	1.995	2.444	2.893	3.342	3.791	4.240	4.689
1/2" M.P. 90° ELBOW	1.546	1.995	2.444	2.893	3.342	3.791	4.240	4.689
1/2" M.P. 45° ELBOW	1.546	1.995	2.444	2.893	3.342	3.791	4.240	4.689
1/2" M.P. 15° ELBOW	1.546	1.995	2.444	2.893	3.342	3.791	4.240	4.689
1/2" M.P. 1/2" TEE	1.546	1.995	2.444	2.893	3.342	3.791	4.240	4.689
1/2" M.P. 1/2" CROSS	1.546	1.995	2.444	2.893	3.342	3.791	4.240	4.689
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1/2" M.P. 1/2" 1/2" 1/2" 45° ELBOW	1.546	1.995	2.444	2.893	3.342	3.791	4.240	4.689
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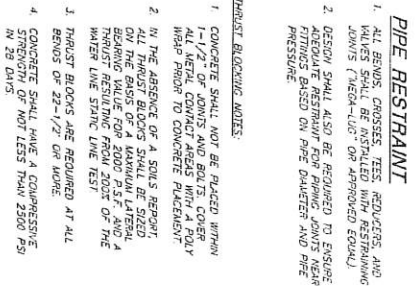
THRUST BLOCK TABLE NOTES:

- IN USING THE ABOVE TABLE, USE THE MAXIMUM INTERNAL PRESSURE ANTICIPATED (I.E. HYDROSTATIC TEST PRESSURE, POSSIBLE SURGE PRESSURE DUE TO PUMP SHUT OFF, ETC.).
- SEE SOIL REPORT FOR BEARING STRENGTH OF SOIL. IN THE ABSENCE OF A SOIL REPORT, CAN BE ASSUMED TO HAVE A BEARING STRENGTH OF 2000 P.S.F.

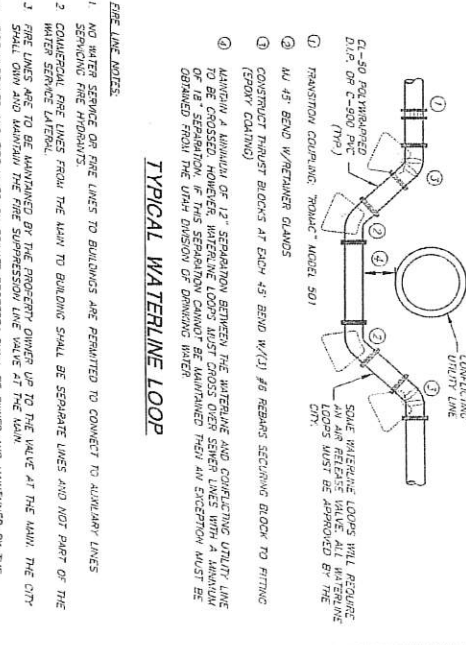
EXAMPLE:
 8-INCH 90° ELBOW, PRESSURE 200 LB./SQ. IN. FROM TABLE: THRUST = 94 X 200 = 18,800 LB. ASSUME BEARING STRENGTH = 2,000 LB./SQ. FT. AREA OF BEARING REQUIRED = 9.4 SQ. FT. FOR THRUST BLOCK.



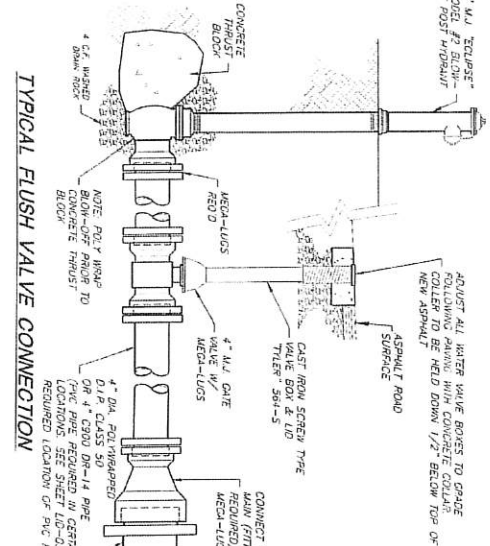
TYPICAL RETAINER GLANDS & THRUST BLOCKING



PIPE RESTRAINT

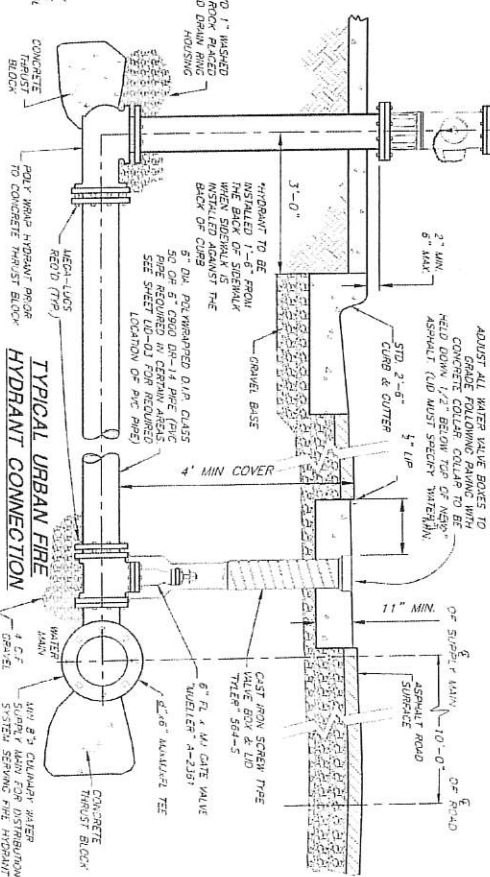


TYPICAL WATERLINE LOOP



BLOW-OFF NOTES:

- PERMANENT BLOW-OFFS SHALL BE 4" AS SHOWN BELOW. TEMPORARY BLOW-OFFS MAY BE 2" WITH 2" POLY AND 2" GATE VALVE WITH VALVE BOX AT MAIN.
- WHEN TEMPORARY BLOW-OFFS ARE REMOVED THE MAIN SHALL ALSO BE REMOVED WHERE THE BLOW-OFF IS CONNECTED.
- NO TAPS ARE ALLOWED ON THE MAIN, USE A CAP W/ THREADED COMP STOP CONNECTION.
- NO FLUSHING DEVICE SHALL BE DIRECTLY CONNECTED TO A SEWER LINE.



TYPICAL URBAN FIRE HYDRANT CONNECTION

PROJECT NO. _____ DATE _____

SCALE: _____

DESIGNED BY: _____

CHECKED BY: _____

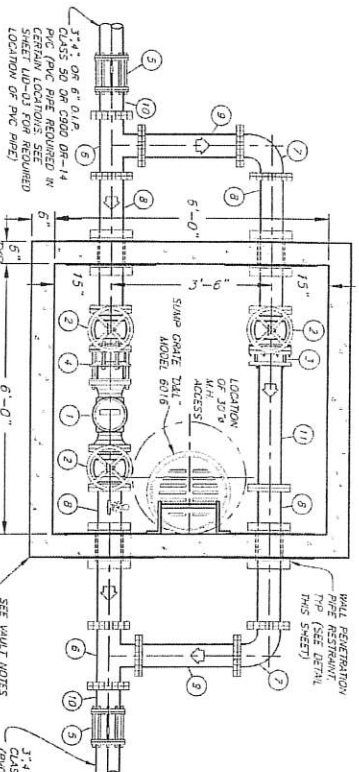
DATE: _____

CONSULTING ENGINEERS
 8800 Foshler Road Drive
 Suite 100, Utah 84143 (801) 798-9789

**CULINARY WATER - THRUST BLOCK, WATERLINE LOOP
 FLUSH VALVE, & FIRE HYDRANT DETAILS**

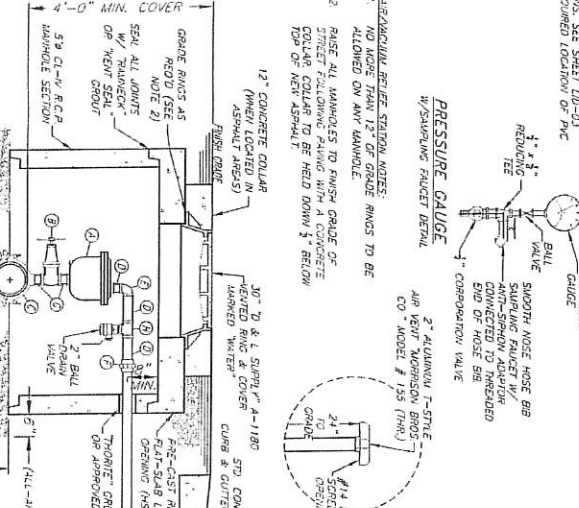
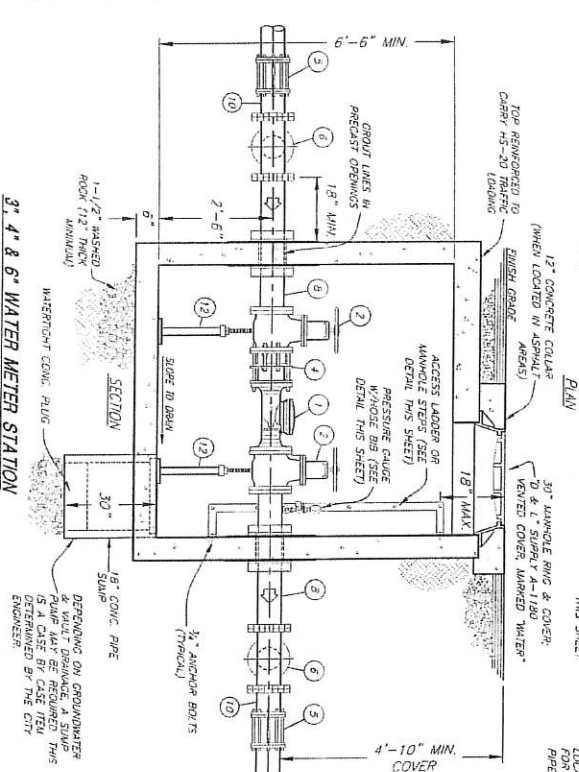
DATE: _____

BY: _____



PIPE & FITTING SCHEDULE

NO	DESCRIPTION (1) (2)	QTY	UNIT	LINE	LINE	LINE
1	WASHER HEAD - GALV. W/ BRASS WASHERS	12	EA	3	6	6
2	WASHER 2" X 3/8" GALV. W/ BRASS WASHERS	12	EA	3	6	6
3	ROUNDED END OF GALVANIZED COUPLER	12	EA	3	6	6
4	ROUNDED END DISMANTLING JOINT	12	EA	3	6	6
5	ROUNDED END FLEXIBLE PIPE COUPLING	12	EA	3	6	6
6	TEE	12	EA	3	6	6
7	90° ELBOW	12	EA	3	6	6
8	W/PLE	12	EA	3	6	6
9	PIPE SECTION	12	FE	3	6	6
10	PIPE SECTION	12	FE	3	6	6
11	W/PLE	12	EA	3	6	6
12	COMPRESSION RING & VARIABLE HEIGHT W/PLE (1) OR (2) OR (3)	12	EA	3	6	6



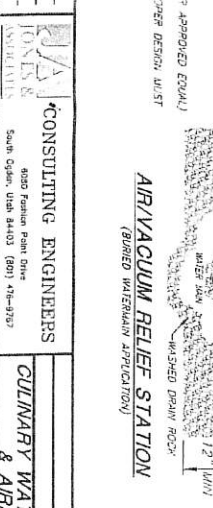
3' 4" & 6" WATER METER STATION

1. ALL DIMENSIONS SHALL BE MIN. C-118 MIN. 13.18 IN. DIMENSIONS ALL DIMENSIONS SHALL BE QUOTE FROM PIPE CLASS 350 P.S.I. MIN.

2. IDENTIFICATION WALLS OUTSIDE OF THE VAULT ARE TO BE DOUBLE BRICK WITH THIN JUTE REINFORCEMENT RETAINERS (REMARK: 1.44MG. OR APPROVED EQUIV.)

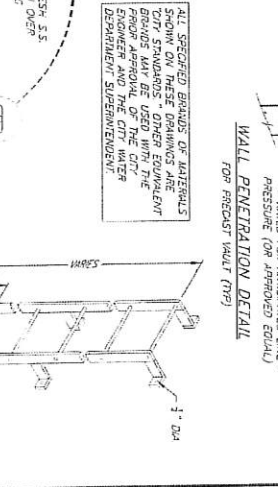
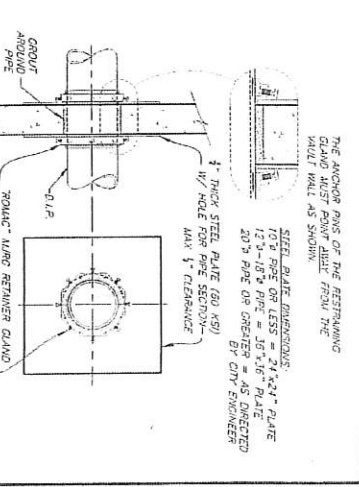
3. IDENTIFICATION WALLS TO BE ACCURATELY DESIGNED STRUCTURE BEARING RELATIVE TO TRAFFIC LOADING AND THUS IDENTIFICATION OF PROPER DESIGN MUST BE PROVIDED TO THE CITY BY THE DESIGNER, CONTRACTOR, OR PROPERTY OWNER AS THE CASE MAY BE.

4. ALL DIMENSIONS SHALL BE MIN. C-118 MIN. 13.18 IN. DIMENSIONS ALL DIMENSIONS SHALL BE QUOTE FROM PIPE CLASS 350 P.S.I. MIN.



AIR/VACUUM RELIEF STATION FITTING SCHEDULE

NO	DESCRIPTION	QTY	UNIT	LINE	LINE	LINE
1	2" HEAVY-DUTY COMBINATION AIR-VACUUM RELIEF VALVE	1	EA	3	6	6
2	2" GALV. W/PLE W/ DOUBLE S.S. STAYS	1	EA	3	6	6
3	2" GALV. W/PLE W/ DOUBLE S.S. STAYS	1	EA	3	6	6
4	2" GALV. W/PLE W/ DOUBLE S.S. STAYS	1	EA	3	6	6
5	2" GALV. W/PLE W/ DOUBLE S.S. STAYS	1	EA	3	6	6
6	2" GALV. W/PLE W/ DOUBLE S.S. STAYS	1	EA	3	6	6
7	2" GALV. W/PLE W/ DOUBLE S.S. STAYS	1	EA	3	6	6
8	2" GALV. W/PLE W/ DOUBLE S.S. STAYS	1	EA	3	6	6
9	2" GALV. W/PLE W/ DOUBLE S.S. STAYS	1	EA	3	6	6
10	2" GALV. W/PLE W/ DOUBLE S.S. STAYS	1	EA	3	6	6



AIR/VACUUM RELIEF STATION

1. ALL DIMENSIONS SHALL BE MIN. C-118 MIN. 13.18 IN. DIMENSIONS ALL DIMENSIONS SHALL BE QUOTE FROM PIPE CLASS 350 P.S.I. MIN.

2. IDENTIFICATION WALLS OUTSIDE OF THE VAULT ARE TO BE DOUBLE BRICK WITH THIN JUTE REINFORCEMENT RETAINERS (REMARK: 1.44MG. OR APPROVED EQUIV.)

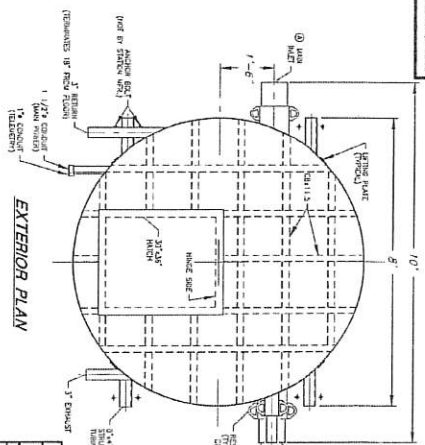
3. IDENTIFICATION WALLS TO BE ACCURATELY DESIGNED STRUCTURE BEARING RELATIVE TO TRAFFIC LOADING AND THUS IDENTIFICATION OF PROPER DESIGN MUST BE PROVIDED TO THE CITY BY THE DESIGNER, CONTRACTOR, OR PROPERTY OWNER AS THE CASE MAY BE.

4. ALL DIMENSIONS SHALL BE MIN. C-118 MIN. 13.18 IN. DIMENSIONS ALL DIMENSIONS SHALL BE QUOTE FROM PIPE CLASS 350 P.S.I. MIN.

1. This drawing and the related specifications are prepared on the basis of the information furnished to the engineer by the applicant for the project and are not to be construed as a contract or a warranty of any kind. The engineer assumes no liability for the accuracy or completeness of the information furnished to him.

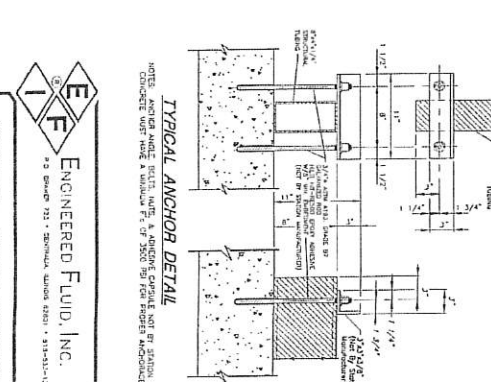
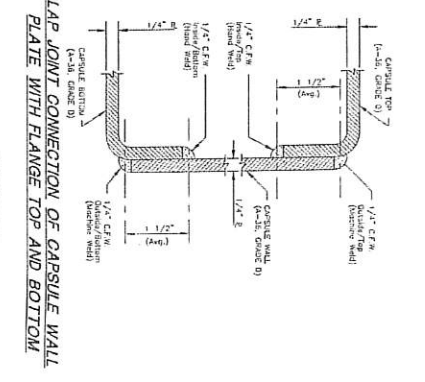
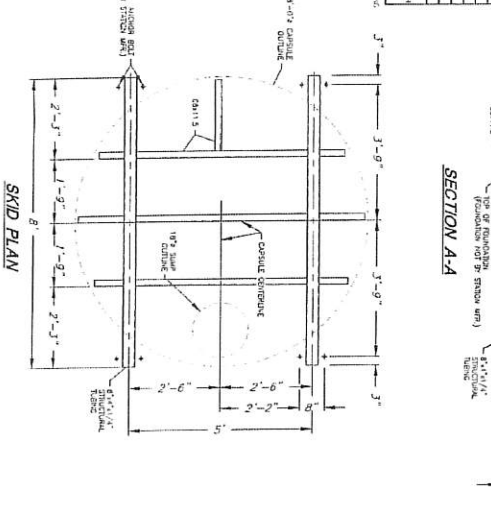
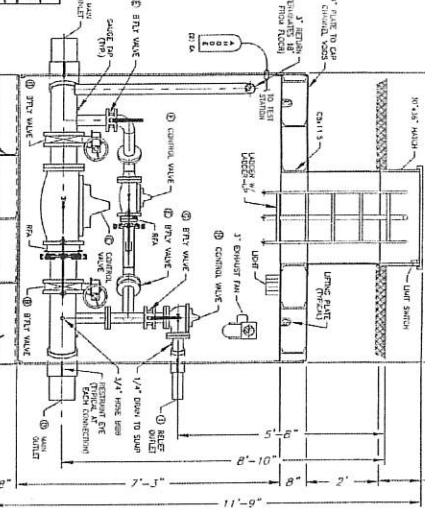
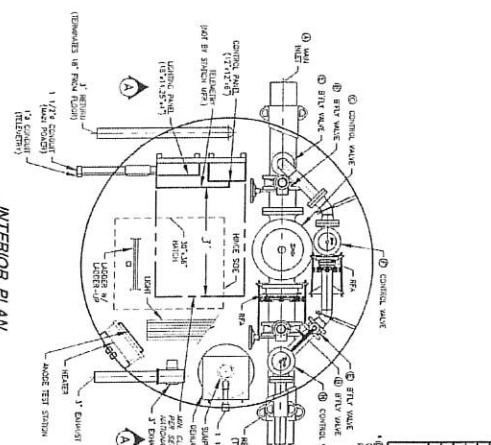
2. It is the responsibility of the applicant to provide all necessary information and to obtain all necessary permits for the project.

3. The engineer's services are limited to the design and preparation of the drawings and specifications. He does not guarantee the construction of the project.



COMPONENT SIZE SCHEDULE

DESCRIPTION	SIZE	UNIT	QTY.
1. MAIN VALVE	12"	VALVE	1
2. BRV VALVE	12"	VALVE	2
3. CONTROL VALVE	6"	VALVE	2
4. MAN VALVE	6"	VALVE	2
5. BRV VALVE	6"	VALVE	2
6. BRV VALVE	6"	VALVE	2
7. BRV VALVE	6"	VALVE	2
8. BRV VALVE	6"	VALVE	2
9. BRV VALVE	6"	VALVE	2
10. BRV VALVE	6"	VALVE	2
11. BRV VALVE	6"	VALVE	2
12. BRV VALVE	6"	VALVE	2
13. BRV VALVE	6"	VALVE	2
14. BRV VALVE	6"	VALVE	2
15. BRV VALVE	6"	VALVE	2
16. BRV VALVE	6"	VALVE	2
17. BRV VALVE	6"	VALVE	2
18. BRV VALVE	6"	VALVE	2
19. BRV VALVE	6"	VALVE	2
20. BRV VALVE	6"	VALVE	2



NOTES:

1. EXISTING STATION AND VALVE DEVICES TO BE REMOVED OR RECONSTRUCTED AS SHOWN ON THIS DRAWING AND AS APPROVED BY THE CITY ENGINEER.
2. ALL NEW WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS AND THIS DRAWING.
3. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY ENGINEER'S APPROVAL.
4. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY ENGINEER'S APPROVAL.
5. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY ENGINEER'S APPROVAL.
6. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY ENGINEER'S APPROVAL.
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8. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY ENGINEER'S APPROVAL.
9. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY ENGINEER'S APPROVAL.
10. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY ENGINEER'S APPROVAL.

PROJECT NUMBER	DATE	TIME	WORKS	SCALE	N.T.S.

CONSULTING ENGINEERS
TOWNERS ENGINEERS
 5200 Federal Point Drive
 South Ogden, Utah 84403 (801) 478-3787

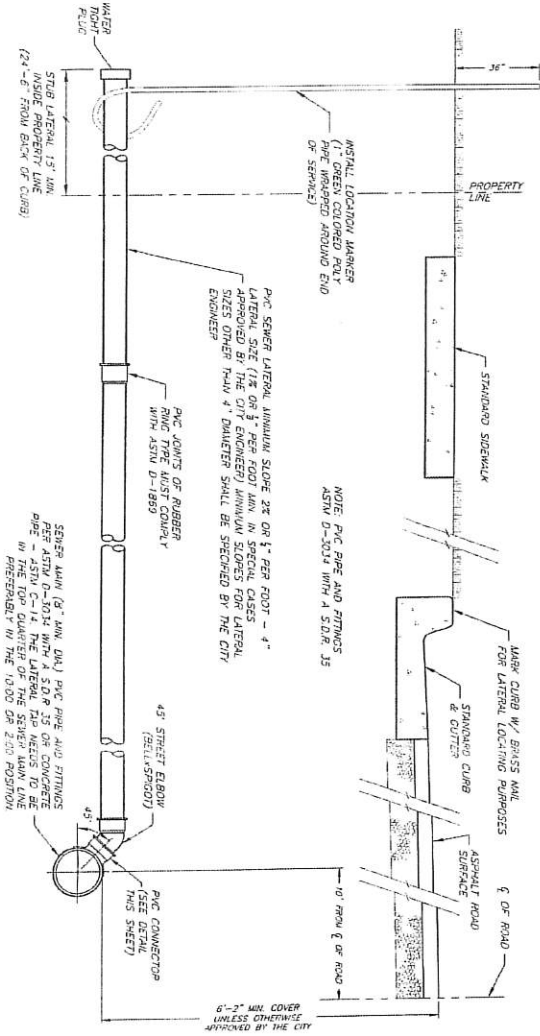
CULINARY WATER - PRESSURE REDUCTION STATION
 NORTH OGDEN CITY CORPORATION
 PUBLIC WORKS STAFFORDS
 203 W. 40 S.
 DATED 08/19/2019
 DWG NO. T-17008-H20-DIG-05
 11/23/2019

ENGINEERED FLUID, INC.
 400 S. MAIN ST. • TERRYVILLE, UTAH 84050 • 801-437-7321

CONTROL VALVE STATION
 NORTH OGDEN, UTAH

GENERAL NOTES:

1. ALL SANITARY SEWER LATERALS SHALL BE CONSTRUCTED ON SLOPE MAINS IN NEW SUBDIVISIONS SHALL BE MADE WITH 12" DRAIN PIPE-CONCRETE WYES OR TEES UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.
2. FLOWLINE ELEVATION OF LATERALS SHALL EQUAL THE INSIDE TOP OF PIPE OR MANHOLE AT THE CONNECTING POINT.
3. ALL MAIN LINES MUST BE A MINIMUM OF 8" DIAMETER PIPE.
4. PVC SANITARY SEWER MAIN LINES SHALL BE "GREEN" IN COLOR. LAND DRAIN LINES ARE "WHITE" IN COLOR. INDICATION PIPES SHALL BE PURPLE IN COLOR. CONTRACTOR TO VERIFY EXISTING PIPE PRIOR TO MAKING ANY CONNECTION.
5. ALL SANITARY SEWER LINES SHALL BE AIR TESTED AND INSPECTED BY MEANS OF VIDEO CAMERA WHEN CONSTRUCTED.
6. SANITARY SEWER LATERALS AND MAINS SHALL HAVE GREEN WARNING TAPE AND GREEN TRACER WIRE FOR LOCATING PURPOSES.
7. SANITARY SEWER SERVICE LATERAL CONNECTIONS SHALL NOT BE ALLOWED IN SENER MANHOLES.
8. SENER LINES SHALL BE CONSTRUCTED INSIDE OF THE RIGHT-OF-WAY.
9. THE LOCATION OF NEW SENER LATERALS MUST BE DOCUMENTED AND SUBMITTED TO THE CITY ON SCALED AS-BUILT DRAWINGS.
10. SENER LATERALS ARE THE RESPONSIBILITY OF THE WORKMAN OWNER TO THE MAIN.
11. CLEMENOUTS ARE NOT ALLOWED ON SENER MAINS. MAINS TO BE TERMINATED WITH A CITY STANDARD MANHOLE.
12. INSERTION TEE PRODUCT IS NOT APPROVED BY THE CITY.
13. ALL CULVERT WATER MAINS AND SERVICES MUST MAINTAIN A MINIMUM SEPARATION FROM ALL SENER MAINS AND LATERALS OF 1'-0" HORIZONTAL AND 18" VERTICAL (WITH THE WATER MAIN ABOVE THE SENER MAIN) IN ACCORDANCE WITH THE STATE OF UTAH DIVISION OF DRAINAGE WATER RULES SECTION R309-500-7.
14. ALL SANITARY SENER LINES SHALL BE AIR TESTED AND INSPECTED BY MEANS OF VIDEO CAMERA FOLLOWING CONSTRUCTION PRIOR TO VIDEO AND MANHOLE CONNECTIONS TO EXISTING SENER LINES SHALL BE BLOCKED TO PREVENT FLUSHED DEBRIS FROM ENTERING SENER CLEAN BY MEANS OF A 4" STREET ELBOW (BELL & SPHOOD) WITH RUBBER RING THE MUST COUPLY WITH ASTM D-1889. AFTER CORRECTING PROBLEMS, TESTS SHALL BE RE-INSTATED BY THE SAME PROCEDURE VIDEO RECORDINGS TO BE DELIVERED TO THE CITY.
15. ALL WORK WITHIN THE CITY'S RIGHT OF WAY TO BE PERFORMED BY A LICENSED CONTRACTOR W/ ALL APPLICABLE PERMITS.

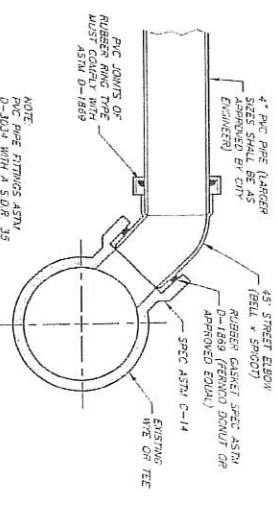


TYPICAL SEWER LATERALS CONNECTION

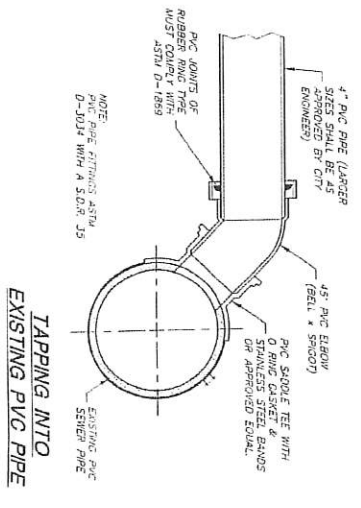
PROJECT NO.	DATE	SCALE	BY	CHECKED	DATE	APPROVED

DESIGNED BY	DATE	SCALE	BY	CHECKED	DATE	APPROVED

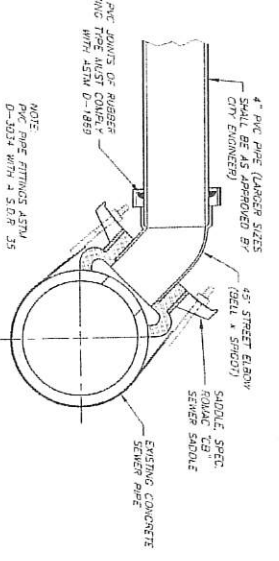
PROJECT NO.	DATE	SCALE	BY	CHECKED	DATE	APPROVED



CONNECTING WYE OR TEE EXISTING WYE OR TEE



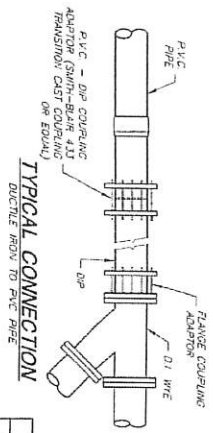
TAPPING INTO EXISTING PVC PIPE



TAPPING INTO EXISTING CONCRETE PIPE

NORTH CANYON CITY CORPORATION		DATE
PUBLIC WORKS STANDARDS		SS-01
SANITARY SEWER - LATERAL & CONNECTION DETAILS		OF 3 SHEETS

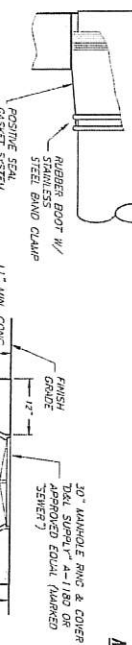
CONSULTING ENGINEERS
 8990 Folsom Park Drive
 Salt Lake City, Utah 84121 (801) 478-9787



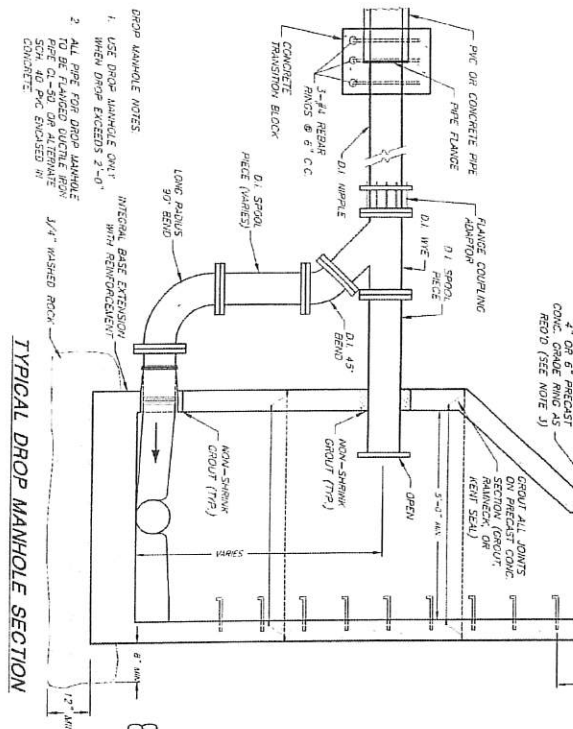
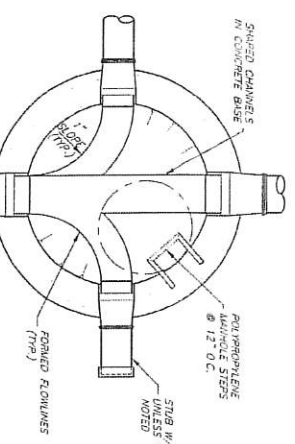
SEWER MANHOLE SPACING

PIPE GRADE	MIN. SPACING (FT)
LESS THAN 48"	200
48" TO 102"	200
102" TO 126"	125
ABOVE 126"	AS APPROVED BY ENGINEER

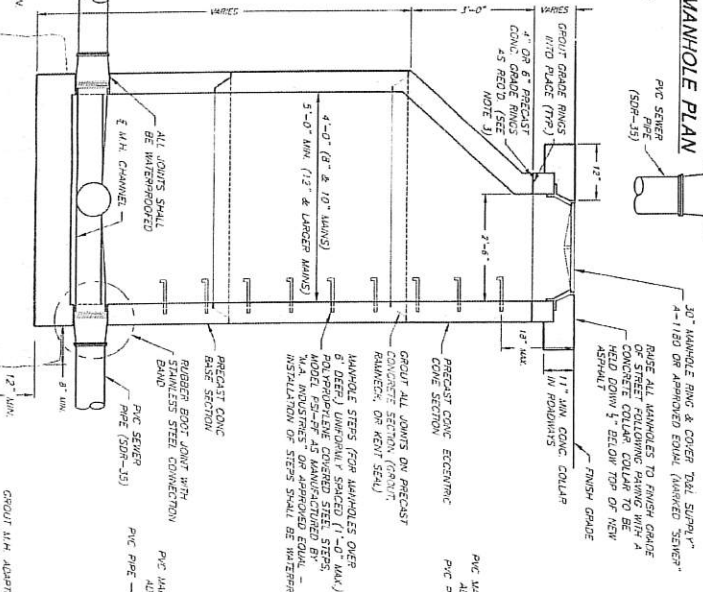
RUBBER BOOT DETAIL



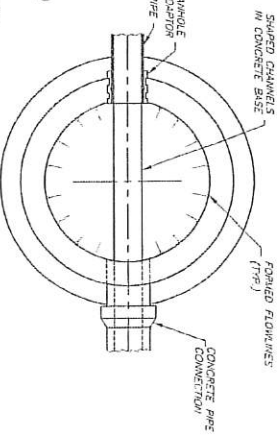
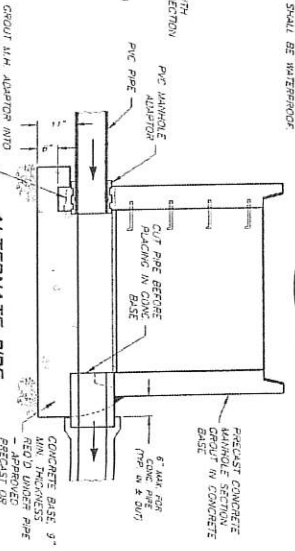
MANHOLE PLAN



TYPICAL MANHOLE SECTION



ALTERNATE PIPE CONNECTION DETAIL



- GENERAL NOTES:**
1. SECURE INVERTS IN ALL MANHOLES DURING CONSTRUCTION, SO AS TO PREVENT CHASEL AND OTHER DEFECTS FROM COLLECTING INSIDE.
 2. A LARGER DIAMETER MANHOLE MAY BE REQUIRED BY THE DESIGN ENGINEER AFTER EVALUATION OF THE NUMBER, SIZE AND ANGLE OF THE PIPES THAT CONNECT TO THE MANHOLE.
 3. NO MORE THAN 12" OF GRADE RISES TO BE ALLOWED ON ANY MANHOLE.
 4. ALL TERMINATING SEWER MAINS SHALL END WITH A CITY STANDARD MANHOLE.
 5. SERVICE LATERAL CONNECTIONS SHALL NOT BE ALLOWED IN SEWER MANHOLES.
 6. ALL SANITARY SEWER LINES SHALL BE INSPECTED BY AGENS OF VIDEO CAMERA AND AIR TESTED WHEN CONSTRUCTED.
 7. MANHOLES SHALL BE LOCATED INSIDE OF THE RIGHT-OF-WAY AND ACCESSIBLE BY CLEANING EQUIPMENT AND TRUCKS.
 8. ALL SEWER MAINS WILL BE GROUTED WHERE THEY ENTER OR EXIT MANHOLES.

PROJECT NUMBER	SCALE	DATE	BY	CHECKED	DATE	BY
	N.T.S.					

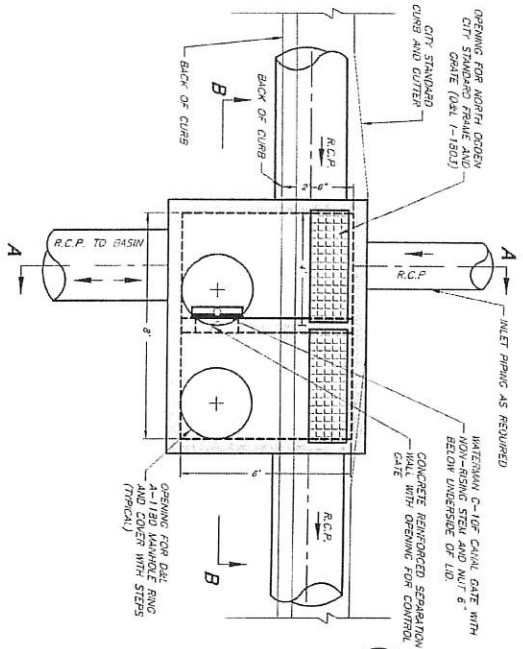
J.A. JONES & ASSOCIATES CONSULTING ENGINEERS
 6000 Fashion Farm Drive
 Suite 600, Utah 84143 (801) 478-9197

SANITARY SEWER - TYPICAL MANHOLES & DETAILS

NORTH CADDEN CITY CORPORATION
 PUBLIC WORKS STANDARDS

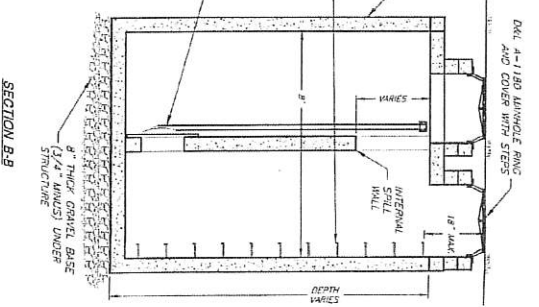
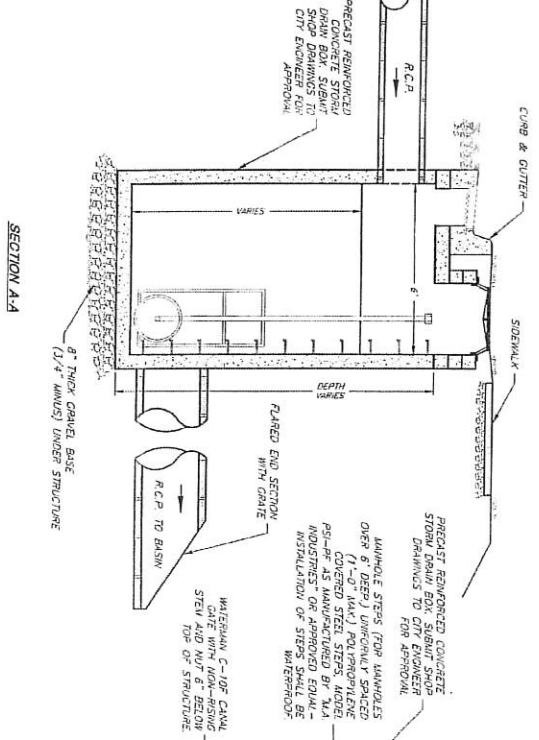
DATE: 11/20/02

SS-02



6'x8' INLET-OUTLET CONTROL STRUCTURE PLAN

- STRUCTURAL NOTES**
1. REINFORCEMENT TO CONFORM WITH ASTM A 615 GRADE 60
 2. CONCRETE SHALL HAVE A 28-DAY COMPRESSIVE STRENGTH OF 4000 PSI
 3. CONCRETE SHALL HAVE A 28-DAY COMPRESSIVE STRENGTH OF 4000 PSI
 4. USE AN AIR-ENTRAINING AGENT ON ALL CONCRETE EXPOSED TO FROST

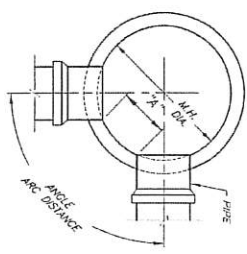


GENERAL NOTE
 IT IS UNDERSTOOD THAT THIS CONTROL STRUCTURE DETAIL MAY NOT BE APPLICABLE TO ALL SITUATIONS. THIS RECOMMENDED DETAIL SHOULD BE FOLLOWED AS MUCH AS PRACTICAL. VARIATIONS CAN BE APPROVED BY THE PUBLIC WORKS DEPARTMENT AND CITY ENGINEER.

PROJECT DESIGN		SCALE		DATE	
NO.	DATE	NO.	DATE	NO.	DATE
DESIGNED BY		CHECKED BY		DATE	
DRAWN BY		DATE			
APPROVED BY		DATE			
CONSULTING ENGINEERS NORTH OGDEN CITY CORPORATION PUBLIC WORKS STANDARDS STORM DRAIN CONTROL STRUCTURE DETAILS					
6800 Franklin Park Drive Salt Lake City, Utah 84143 (801) 478-9787				SHEET SD-09 OF 10 SHEETS	

PIPE SIZES / ARC DISTANCE

M.H. SIZE	M.H. L.S.	M.H. R.S.	M.H. T.S.	M.H. B.S.	M.H. C.S.	M.H. D.S.	M.H. E.S.	M.H. F.S.	M.H. G.S.	M.H. H.S.	M.H. I.S.	M.H. J.S.	M.H. K.S.	M.H. L.S.	M.H. M.S.	M.H. N.S.	M.H. O.S.	M.H. P.S.	M.H. Q.S.	M.H. R.S.	M.H. S.S.	M.H. T.S.	M.H. U.S.	M.H. V.S.	M.H. W.S.	M.H. X.S.	M.H. Y.S.	M.H. Z.S.
12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"	12"



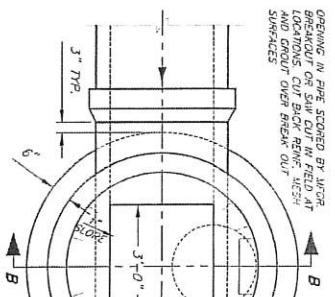
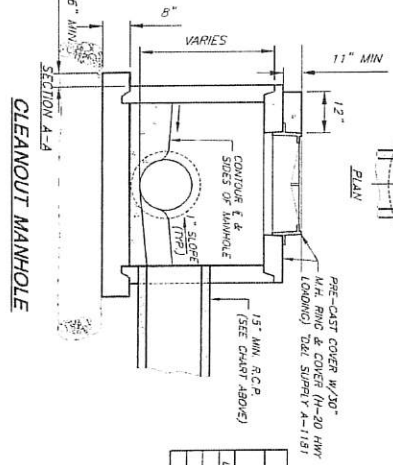
- SIZING NOTES:**
1. SUGGESTED "X" DISTANCE IS 6" OR MANHOLES
 2. SUGGESTED "Y" DISTANCE IS 8" OR ORIGIN FOR 84" AND 96" DIAMETER MANHOLES

GENERAL NOTES:

1. STORM DRAIN MANHOLE DIAMETER TO BE DETERMINED BY THE DESIGN NUMBER, SIZE AND PIPE ENTRY ANGLE OF THE PIPES THAT CONNECT TO THE MANHOLE.
2. NO MORE THAN 12" OF GRADE RINGS TO BE ALLOWED ON ANY MANHOLE.
3. RINGED COVERS SHALL BE USED AT ALL MANHOLE ENTRIES DURING CONSTRUCTION AND MAINTENANCE ACTIVITIES.
4. ALL INTERIOR JOINTS SHALL BE SHORPLY AND FINELY GROUDED WITH NON-SHRINK GROUT MAX.
5. MANHOLE STEPS (UNGRAVELLED SPACED 1'-0" MAX.) POLYPROPYLENE COVERED STEEL STEPS (MIN. 25-35 AS MANUFACTURED BY M.A. INDUSTRIES) OR APPROVED EQUAL MATERIALS. SPACING OF STEPS SHALL BE

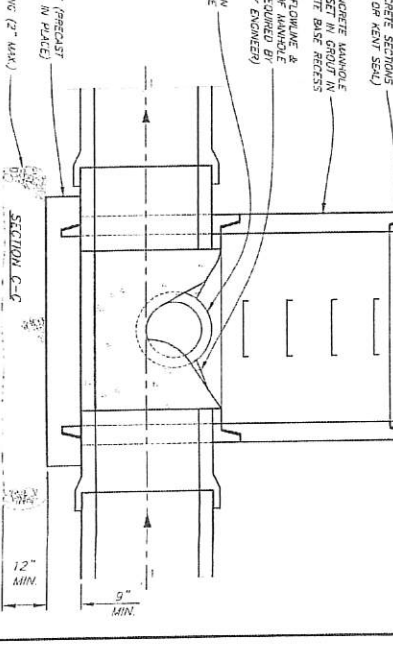
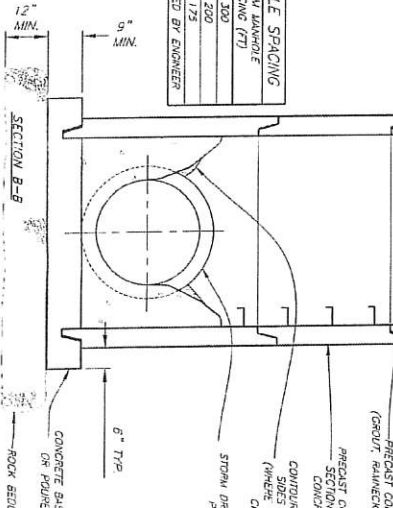
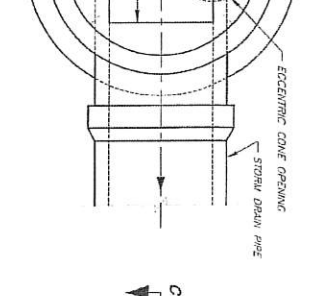
STORM DRAIN MANHOLE SPACING

PIPE GRADE	MAXIMUM SPACING (FT)
LESS THAN 8%	300
8% TO 12%	200
12% TO 15%	175
ABOVE 15%	AS APPROVED BY ENGINEER



GENERAL NOTES:

1. STD. 30" C.I. RING & COVER T&L SUPPLY A-1181 OR EQUAL (MARKED "STORM DRAIN")
2. 6" GRADE RINGS AS REQ'D. (SEE NOTE)
3. GROUT ALL JOINTS ON PRECAST CONCRETE MANHOLE (GROUT FLOWLINE OR KEYW. SEAL)
4. PRECAST CONCRETE MANHOLE SECTION SET IN GROUT IN CONCRETE BASE RECESS
5. CONTOUR FLOWLINE & SIDES OF MANHOLE (WHERE REQUIRED BY CITY ENGINEER)
6. STORM DRAIN PIPE
7. CONCRETE BASE (PRECAST OR POURED IN PLACE)
8. ROCK BEDDING (2" MAX.)



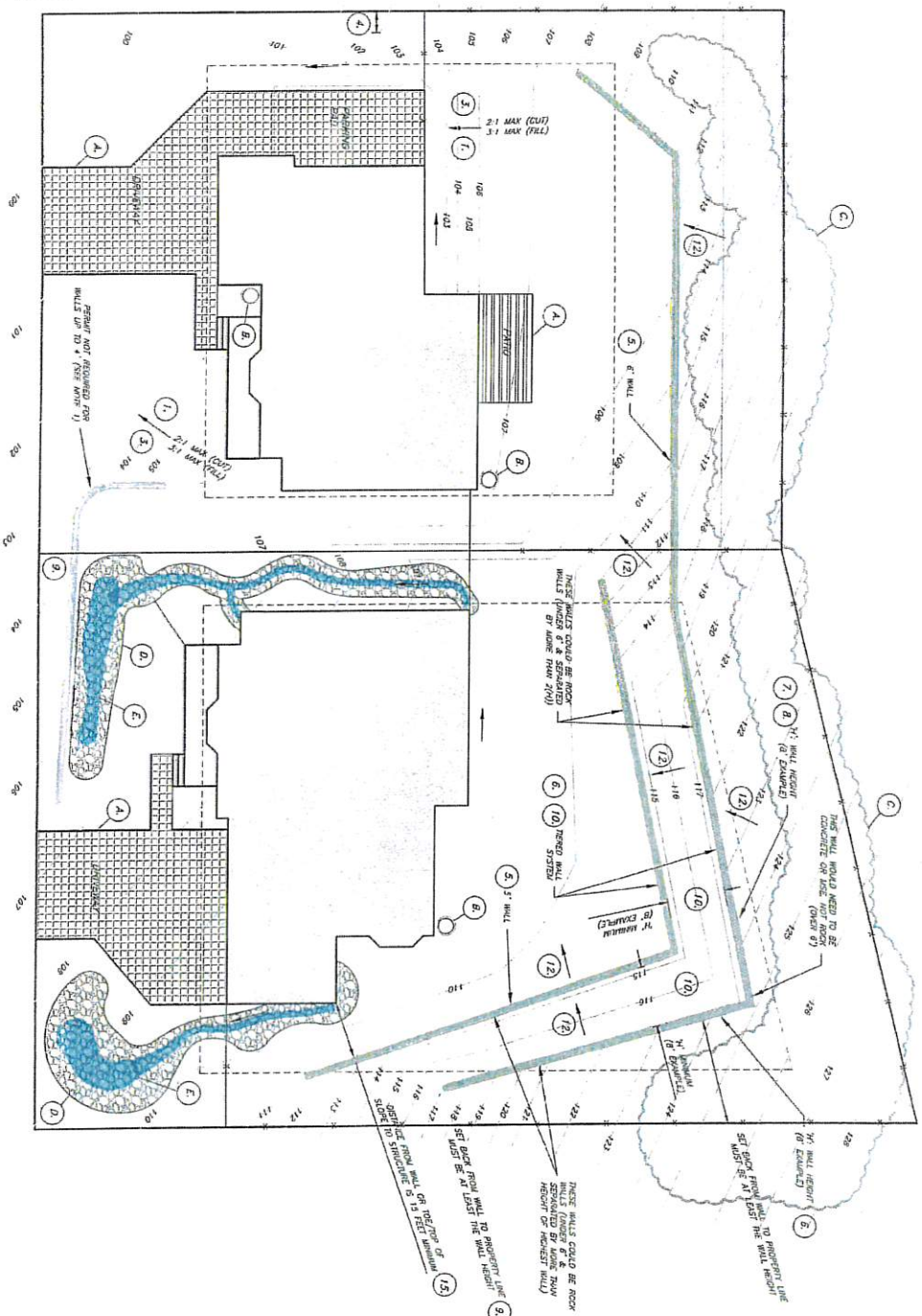
CONSULTING ENGINEERS

6800 Fashion Park Drive
South Ogden, Utah 84403 (801) 978-9397

NORTH OGDEN CITY CORPORATION
PUBLIC WORKS STANDARDS

SD-04
OF 14 SHEETS

DATE: _____
BY: _____
CHECKED: _____
DATE: _____



PROJECT NUMBER		DATE	
SHEET		SCALE	
N.T.S.		DATE	
DESIGN BY		DATE	
CHECKED BY		DATE	
APPROVED BY		DATE	
L.I.D. NOTES, GRADING AND RETAINING WALLS			
NORTH CADDEN CITY CORPORATION		SHEET	
PUBLIC WORKS STANDARDS		LS-09	
		OF SHEETS	

LOW IMPACT DEVELOPMENT (LID) STANDARDS AT THE PLANNING STAGES. IF THE DESIGNER IS REQUIRED TO PROVIDE LID STANDARDS AT THE PLANNING STAGES, THE FOLLOWING STANDARDS SHOULD BE USED TO GUIDE THE DESIGNER'S DECISIONS. THESE STANDARDS INCLUDE THE FOLLOWING PRACTICES:

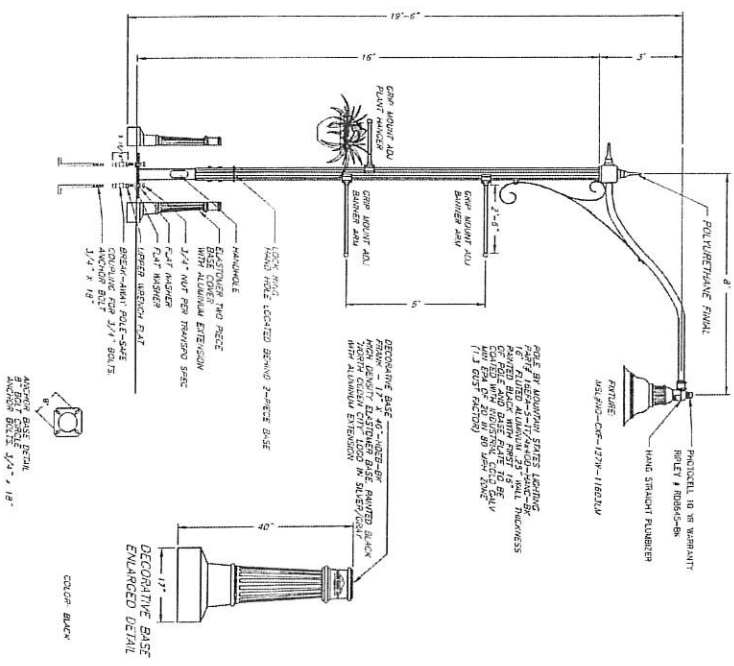
1. RETAINING WALLS SHOULD BE DESIGNED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
2. ALL SLOPES SHALL BE STABILIZED TO PREVENT EROSION AND TO PROTECT THE PUBLIC RIGHT-OF-WAY.
3. RETAINING WALLS SHALL BE DESIGNED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
4. THE USE OF PERMEABLE PAVING SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
5. THE USE OF VEGETATION SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
6. THE USE OF SWALES SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
7. THE USE OF BIOMIMICRY SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
8. THE USE OF NATURAL VEGETATION SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
9. THE USE OF PERMEABLE CURBS SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
10. THE USE OF PERMEABLE DRIVEWAYS SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
11. THE USE OF PERMEABLE SIDEWALKS SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
12. THE USE OF PERMEABLE PATHS SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
13. THE USE OF PERMEABLE PLAY AREAS SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
14. THE USE OF PERMEABLE SPORTS AREAS SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
15. A STRUCTURE CANNOT BE LOCATED WITHIN 15 FEET OF THE TOP OF THE RETAINING WALL OR WITHIN 15 FEET OF THE BASE OF THE RETAINING WALL.

DESIGN AND RETAINING WALL NOTES:

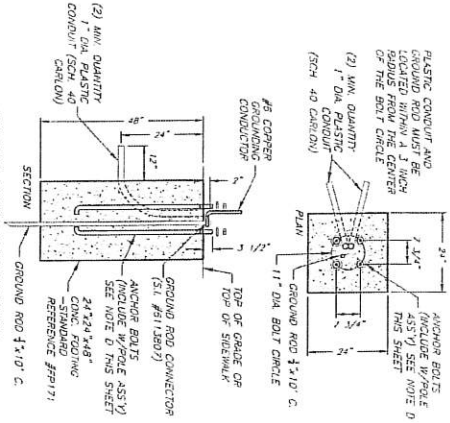
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6. THE USE OF SWALES SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
7. THE USE OF BIOMIMICRY SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
8. THE USE OF NATURAL VEGETATION SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
9. THE USE OF PERMEABLE CURBS SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
10. THE USE OF PERMEABLE DRIVEWAYS SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
11. THE USE OF PERMEABLE SIDEWALKS SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
12. THE USE OF PERMEABLE PATHS SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
13. THE USE OF PERMEABLE PLAY AREAS SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
14. THE USE OF PERMEABLE SPORTS AREAS SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
15. A STRUCTURE CANNOT BE LOCATED WITHIN 15 FEET OF THE TOP OF THE RETAINING WALL OR WITHIN 15 FEET OF THE BASE OF THE RETAINING WALL.

CONSTRUCTION METHODS AND PRACTICES CAN HAVE A NEGATIVE IMPACT ON STORM WATER AND THE ENVIRONMENT. PROPER CONSTRUCTION PRACTICES CAN HELP REDUCE THESE IMPACTS. THE FOLLOWING PRACTICES SHOULD BE USED TO GUIDE THE DESIGNER'S DECISIONS. THESE STANDARDS INCLUDE THE FOLLOWING PRACTICES:

1. RETAINING WALLS SHOULD BE DESIGNED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
2. ALL SLOPES SHALL BE STABILIZED TO PREVENT EROSION AND TO PROTECT THE PUBLIC RIGHT-OF-WAY.
3. RETAINING WALLS SHALL BE DESIGNED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
4. THE USE OF PERMEABLE PAVING SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
5. THE USE OF VEGETATION SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
6. THE USE OF SWALES SHALL BE ENCOURAGED TO REDUCE STORM WATER RUNOFF FROM THE SITE AND TO INCREASE INFILTRATION OF STORM WATER INTO THE GROUND.
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15. A STRUCTURE CANNOT BE LOCATED WITHIN 15 FEET OF THE TOP OF THE RETAINING WALL OR WITHIN 15 FEET OF THE BASE OF THE RETAINING WALL.



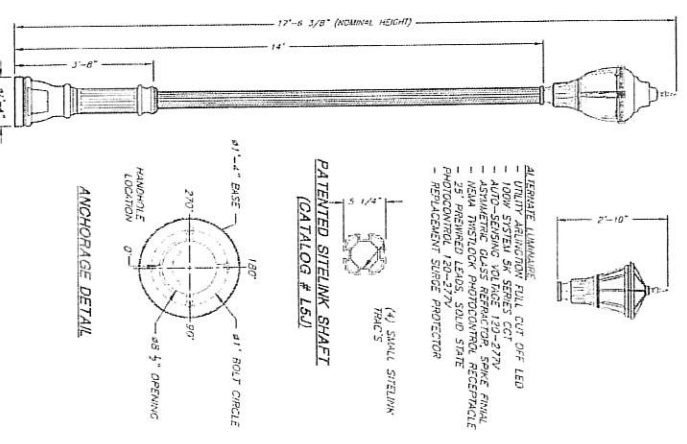
DECORATIVE LIGHT POLE WITH MAST ARM



TYPICAL CONCRETE FOOTING

THE FOOTING AS SPECIFIED ON THIS STANDARD IS DESIGNED FOR USE WITH THE STD. 11\"/>

- FOOTING NOTES:**
- FOOTINGS WILL GENERALLY BE INSTALLED BY A CONTRACTOR. FOOTINGS SHOULD BE LOCATED WITH THE END OF THE ROD VERTICAL & 24\"/>
 - THE MANUFACTURER SHALL FINISH (1) ANCHOR BOLTS, (2) GROUND ROD & PLASTIC CONDUITS FOR EACH FOOTING AS NOTED, OR THE PLASTIC CONDUITS ARE INSTALLED BY THE UNDERGROUNDING CONTRACTOR AND SHOULD BE DETERMINED IN EACH LOCATION FOR THE MOST PRACTICAL SOLUTION.
 - ANCHOR BOLTS SHALL BE FINISHED WITH 6\"/>



DECORATIVE LIGHT POLE WITHOUT MAST ARM

FOOT DESCRIPTION:

THE LIGHTING POLE SHALL BE ALL ALUMINUM CONSTRUCTION CONSISTING OF A POLE TOP ADAPTER PLATE, RAYBOND STEEL #13 SERIES SHAFT AND A

- ALTERNATE LUMINAIRE
- UTILITY ATTACHMENT FULL CUT OFF LED
- LED - SOILING SHIELD 120-277V
- ASYMMETRIC GLASS REFLECTOR, SPWEE FINISH
- NEVA INSTOCK PHOTOCONTROL, RECEPTACLE PHOTOCONTROL 120-277V
- REPLACEMENT SWAGE PROTECTOR

PROJECT NUMBER	SCALE	DATE	BY	CHKD
	1/4\"/>			

DESIGN NO.	DATE
00000	00/00/00

CONSULTING ENGINEERS	SCALE
6000 Fulshear, Rich Dale	1/4\"/>

STREET LIGHTING STANDARDS - DECORATIVE LIGHTING	SCALE
	1/4\"/>

Storm Water – Low Impact Development (LID) Recommended Practices and Details

1. WET SWALES – LID-01

Short Description:
Wet Swales are a type of retention, storage and slow release storm water management practice that is used to manage storm water runoff. They are typically used in conjunction with other LID practices to manage storm water runoff. Wet Swales are designed to capture and store storm water runoff, allowing it to infiltrate the ground and be filtered by the soil. This helps to reduce the volume of storm water runoff that enters the storm sewer system, thereby reducing the amount of storm water runoff that enters the storm sewer system. Wet Swales are also designed to filter out sediment and other pollutants from storm water runoff, helping to improve water quality. Wet Swales are typically used in conjunction with other LID practices to manage storm water runoff. They are recommended as a best management practice for storm water runoff management.

Cost Range	\$55
Cost	\$55

Final Condition for Installation	As Shown
Preparation	Grading, Excavation, Drainage, Erosion Control, Planting
Installation	Excavation, Drainage, Erosion Control, Planting
Post-Installation	Planting, Maintenance

Water Availability	Ground
Construction	Excavation, Drainage, Erosion Control, Planting
Materials	Gravel, Sand, Soil, Plants
Methods	Excavation, Drainage, Erosion Control, Planting
Notes	See also wet swales

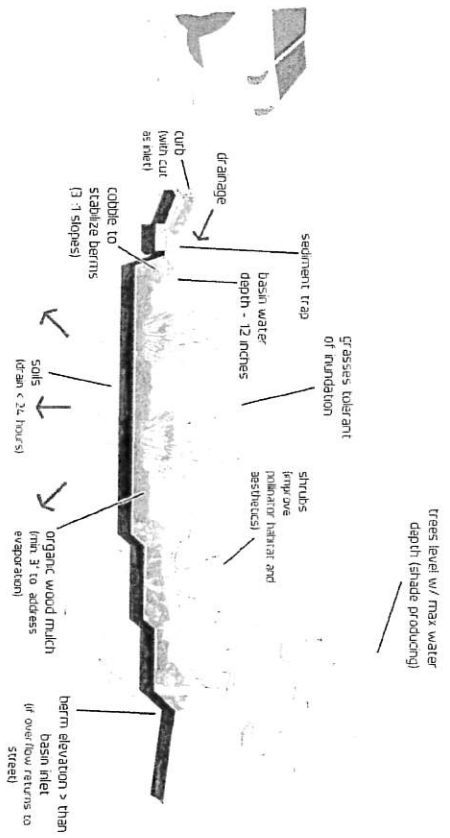
Performance	Retention, Storage, Slow Release
Typical	Retention, Storage, Slow Release
Maximum	Retention, Storage, Slow Release
Minimum	Retention, Storage, Slow Release
Notes	See also wet swales

Construction Sequence	1. Perform continuous inspection of erosion control practices. 2. Install the base along the perimeter of the site to prevent sediment from leaving the site during the construction process. 3. All erosion control practices and sediment control devices must be in place before any soil grading, trenching, or other earthwork activities begin. 4. Remove silt from the site and place in temporary storage location. Immediately refill the site with topsoil. 5. Install and/or adjust erosion control devices, including silt fences, sediment traps, and other devices, to prevent erosion during construction. 6. Seed and mulch disturbed areas on site. 7. Construct the walls along the location and function of storm water pipes and conduits. 8. Perform all other site improvements, taking the location and function of the storm water pipes into consideration. 9. Final grade the site. 10. Schedule the site for replanting, the water seeding, and planting of the site. 11. Install the erosion control devices and final site work plan. 12. Remove the site from the site and notify the project engineer approved.
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Links	<p>1. Wet Swales</p> <p>2. Wet Swales</p> <p>3. Wet Swales</p> <p>4. Wet Swales</p> <p>5. Wet Swales</p> <p>6. Wet Swales</p> <p>7. Wet Swales</p> <p>8. Wet Swales</p> <p>9. Wet Swales</p> <p>10. Wet Swales</p> <p>11. Wet Swales</p> <p>12. Wet Swales</p>
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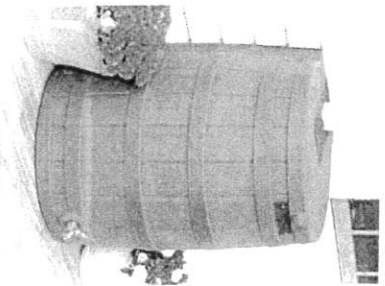
Specifications	<p>1. The swale shall be a minimum of 12 inches deep and 12 inches wide at the bottom. The slope shall be a minimum of 2:1.</p> <p>2. The swale shall be a minimum of 12 inches deep and 12 inches wide at the bottom. The slope shall be a minimum of 2:1.</p> <p>3. The swale shall be a minimum of 12 inches deep and 12 inches wide at the bottom. The slope shall be a minimum of 2:1.</p> <p>4. The swale shall be a minimum of 12 inches deep and 12 inches wide at the bottom. The slope shall be a minimum of 2:1.</p> <p>5. The swale shall be a minimum of 12 inches deep and 12 inches wide at the bottom. The slope shall be a minimum of 2:1.</p> <p>6. The swale shall be a minimum of 12 inches deep and 12 inches wide at the bottom. The slope shall be a minimum of 2:1.</p> <p>7. The swale shall be a minimum of 12 inches deep and 12 inches wide at the bottom. The slope shall be a minimum of 2:1.</p> <p>8. The swale shall be a minimum of 12 inches deep and 12 inches wide at the bottom. The slope shall be a minimum of 2:1.</p> <p>9. The swale shall be a minimum of 12 inches deep and 12 inches wide at the bottom. The slope shall be a minimum of 2:1.</p> <p>10. The swale shall be a minimum of 12 inches deep and 12 inches wide at the bottom. The slope shall be a minimum of 2:1.</p> <p>11. The swale shall be a minimum of 12 inches deep and 12 inches wide at the bottom. The slope shall be a minimum of 2:1.</p> <p>12. The swale shall be a minimum of 12 inches deep and 12 inches wide at the bottom. The slope shall be a minimum of 2:1.</p>
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Basic Basin Design Considerations

*** <http://www.lid-systems.com/learn/3basin.asp> ***

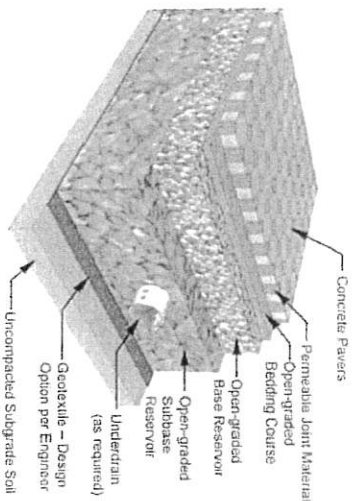
diagram by
Paul Naylor
for SUH



RAIN BARREL

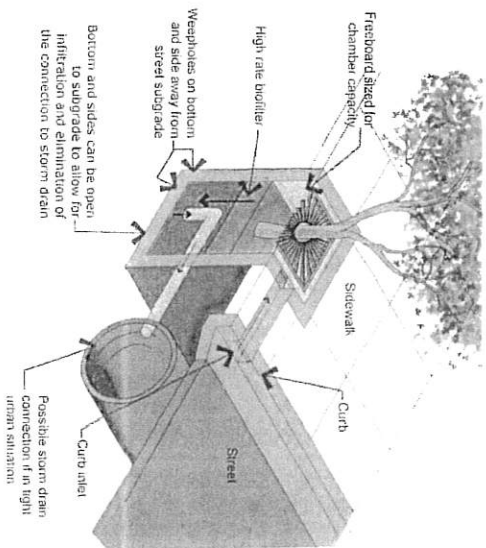
*** <http://www.gardenscience.com/product/rain-barrels/rain-water-50/> ***

DISCLAIMER:
ALL LID EXAMPLES SHOWN ON THIS SHEET ARE FOR REFERENCE PURPOSES ONLY. ANY SPECIFIC WEBSITE, COMPANY, MANUFACTURER, PRODUCT OR SERVICE IS NOT ENDORSED, RECOMMENDED OR FAVORABLE BY NORTH OGDEN CITY. THE PURPOSE OF PROVIDING SPECIFIC AND/OR ANECDOTAL EXAMPLES IS TO ILLUSTRATE THE CONCEPTS AND REFERENCES TO ASSESS THE USEFULNESS OF THE PRODUCT.



PERMEABLE PAVER

From Smith, D. 2005. *Permeable Interlocking Concrete Pavement*. Introducing Concrete Pavement Institute, Henderson, VA



TREE BOX FILTER
From www.widg.org

PROJECT SHEET	DATE	SCALE	DESIGNED BY	DATE	PROJECT NO.	SHEET NO.
		N.T.S.				
			CONSULTING ENGINEERS 6000 Fashion Plaza Drive South Ogden, Utah 84403 (801) 475-9757			
GENERAL - LID (LOW IMPACT DEVELOPMENT) EXAMPLES						SHEET LID-02 OF 2 SHEETS

Storm Water – Low Impact Development (LID) Recommended Best Management Practices

3. Dry Swale – LID-03

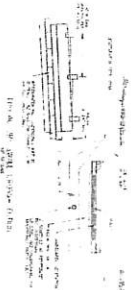
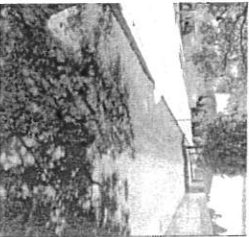
A dry swale is a shallow, gently sloping drainage channel with broad, vegetated, side slopes. Swales provide temporary storage, filtration, and infiltration of stormwater runoff. A dry swale is versatile because the area it requires is relatively small. They can be used in place of curbs, gutters, and storm drainage systems. Reduced channel velocities increase infiltration and water quality treatment. It effectively reduces and retards peak runoff. Channel vegetation can include turf, meadow grass, shrubs and – in limited quantities – small trees. They are always located above the water table to provide drainage.

Cost Range:	Construction: \$ O&M: \$
Ideal Conditions for Installation	Precipitation: All Soils: Permeable Groundwater: Deep
Where/Applicability	Residential: Yes Commercial: Yes Urban Urban: Yes Industrial: Yes Highway/road: Yes Airport: Yes
Maintenance	Frequency: Yearly Type: None, Firm, Sediment removal Monitoring: No Permit Required: No
Performance:	TSS: High Chloride: Low Turbidity: Medium Oil and Grease: High Pathogens: Low

Construction Sequence

1. Perform construction inspection of erosion control practices.
2. Prepare final plan for the dry swale. The construction method should be approved by the local authority having jurisdiction (LAHJ) prior to construction.
3. Excavate the dry swale to the required depth and width. The depth should be 4 to 6 inches (100 mm) below the subgrade. The width should be 18 to 24 inches (450 to 600 mm) at the top. The bottom width should be 12 to 18 inches (300 to 450 mm).
4. Compact the bottom of the dry swale to the required density.
5. Install the final finish material on the bottom of the dry swale.
6. Compact the final finish material to the required density.
7. Install the final finish material on the sides of the dry swale.
8. Compact the final finish material to the required density.
9. Install the final finish material on the top of the dry swale.
10. Compact the final finish material to the required density.
11. Install the final finish material on the bottom of the dry swale.
12. Compact the final finish material to the required density.
13. Install the final finish material on the sides of the dry swale.
14. Compact the final finish material to the required density.

Download:	https://www.livelihood.com/Products/Download
References:	https://www.livelihood.com/Products/Download https://www.livelihood.com/Products/Download
Specifications:	1. All LID structures shall be constructed in accordance with the specifications of the local authority having jurisdiction (LAHJ). 2. All LID structures shall be constructed in accordance with the specifications of the local authority having jurisdiction (LAHJ). 3. All LID structures shall be constructed in accordance with the specifications of the local authority having jurisdiction (LAHJ). 4. All LID structures shall be constructed in accordance with the specifications of the local authority having jurisdiction (LAHJ). 5. All LID structures shall be constructed in accordance with the specifications of the local authority having jurisdiction (LAHJ). 6. All LID structures shall be constructed in accordance with the specifications of the local authority having jurisdiction (LAHJ). 7. All LID structures shall be constructed in accordance with the specifications of the local authority having jurisdiction (LAHJ). 8. All LID structures shall be constructed in accordance with the specifications of the local authority having jurisdiction (LAHJ). 9. All LID structures shall be constructed in accordance with the specifications of the local authority having jurisdiction (LAHJ). 10. All LID structures shall be constructed in accordance with the specifications of the local authority having jurisdiction (LAHJ). 11. All LID structures shall be constructed in accordance with the specifications of the local authority having jurisdiction (LAHJ). 12. All LID structures shall be constructed in accordance with the specifications of the local authority having jurisdiction (LAHJ). 13. All LID structures shall be constructed in accordance with the specifications of the local authority having jurisdiction (LAHJ). 14. All LID structures shall be constructed in accordance with the specifications of the local authority having jurisdiction (LAHJ). 15. All LID structures shall be constructed in accordance with the specifications of the local authority having jurisdiction (LAHJ).



Download: <https://www.livelihood.com/Products/Download>

References: <https://www.livelihood.com/Products/Download>, <https://www.livelihood.com/Products/Download>

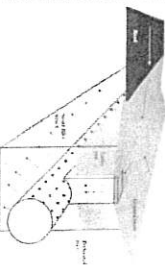
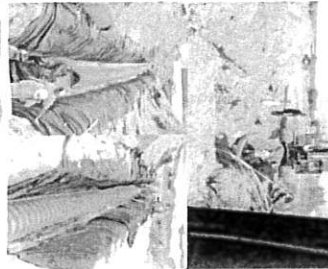
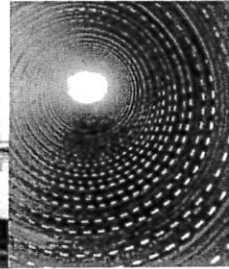
Specifications:

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Storm Water – Low Impact Development (LID) Recommended Best Management Practices

4. Infiltration Galleries (Generic) – IUD-04

Cost Range:	\$55
Cost/Action:	\$
Ideal Conditions for Installation:	Best suited for high intensity and high frequency events. Aerially applied, A and B, possibly C depending on the hydraulic transmission rate.
Groundwater:	Below the structure lowest part
Value/Applicability:	<p>Residential: Yes – away from structure foundations</p> <p>Commercial: Yes – away from structure foundations</p> <p>Industrial: Yes</p> <p>Highway/Road: Yes – away from the road foundation system</p> <p>Service: Utility</p>
Maintenance:	<p>Frequency: In dry climates it can be done yearly</p> <p>Type: Visual inspection, sensors accumulated</p> <p>Monitoring: Annual Visual Inspection</p> <p>Permeability: N/A</p>
Performance:	<p>Total Suspended Solids (TSS): Fine, Medium</p> <p>Total Suspended Solids (TSS): Coarse, High</p> <p>Chloride: N/A</p> <p>Oil and Grease (TOG): N/A</p> <p>Mercury: Medium</p> <p>Oil and Grease: Medium</p> <p>Pathogens: High</p>
Construction Sequence:	The construction sequence varies according to the system chosen.
Design:	<p>Design is in series for the application involving both uniform and non-uniform flow. The design is based on the volume of retention required to store frequency volume to be exceeded the exceedance frequency, size, long and deep to clear the pervious layer (base material) – One layer at the bottom of the trench. The fabric should be used and have a minimum permeability. The trench should be designed to allow the water to infiltrate the pervious layer that is below the trench design.</p> <p>Design should be based on the design of the system. The design should be based on the design of the system. The design should be based on the design of the system.</p> <p>Design should be based on the design of the system. The design should be based on the design of the system. The design should be based on the design of the system.</p>
Performance:	<p>For the application involving both uniform and non-uniform flow, the design is based on the volume of retention required to store frequency volume to be exceeded the exceedance frequency, size, long and deep to clear the pervious layer (base material).</p> <p>Design should be based on the design of the system. The design should be based on the design of the system. The design should be based on the design of the system.</p>



Standard:	<p>DOT/AR/150 Section 1312</p> <p>DOT/AR/150 Section 1312</p> <p>DOT/AR/150 Section 1312</p>
Link:	<p>DOT/AR/150 Section 1312</p> <p>DOT/AR/150 Section 1312</p> <p>DOT/AR/150 Section 1312</p>
Significance:	<p>Permeability:</p> <p>Permeability: it is recommended to remove sediments and</p> <p>Permeability: it is recommended to remove sediments and</p>
Notes:	<p>For general, follow manufacturer specifications:</p> <p>Material and procedure for installing the system:</p> <p>Types, size, thickness designation:</p> <p>Material and procedure for installing the system:</p> <p>Types, size, thickness designation:</p> <p>Material and procedure for installing the system:</p> <p>Types, size, thickness designation:</p>

References:	<p>DOT/AR/150 Section 1312</p> <p>DOT/AR/150 Section 1312</p> <p>DOT/AR/150 Section 1312</p>
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• Definitions

- **1. Cover** - The vertical section that allows the flow of the pipe to collect. Refer to 2025 Project Standard D21-104.
- **2. Endowment** - A vertical section that covers the top of the pipe and is designed to provide a means of protection for the pipe to resist the movement of soil and to provide a means of protection for the pipe to resist the movement of soil and to provide a means of protection for the pipe to resist the movement of soil.
- **3. Endowment** - A vertical section that covers the top of the pipe and is designed to provide a means of protection for the pipe to resist the movement of soil and to provide a means of protection for the pipe to resist the movement of soil.
- **4. Endowment** - A vertical section that covers the top of the pipe and is designed to provide a means of protection for the pipe to resist the movement of soil and to provide a means of protection for the pipe to resist the movement of soil.
- **5. Endowment** - A vertical section that covers the top of the pipe and is designed to provide a means of protection for the pipe to resist the movement of soil and to provide a means of protection for the pipe to resist the movement of soil.
- **6. Endowment** - A vertical section that covers the top of the pipe and is designed to provide a means of protection for the pipe to resist the movement of soil and to provide a means of protection for the pipe to resist the movement of soil.
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- **9. Endowment** - A vertical section that covers the top of the pipe and is designed to provide a means of protection for the pipe to resist the movement of soil and to provide a means of protection for the pipe to resist the movement of soil.
- **10. Endowment** - A vertical section that covers the top of the pipe and is designed to provide a means of protection for the pipe to resist the movement of soil and to provide a means of protection for the pipe to resist the movement of soil.

• Submittals

- Provide manufacturer's catalog or literature showing the product details, advanced installation.
- Provide a Certificate of Compliance from the manufacturer carrying specific conditions.

• H Products

• Materials

• Structure Type

- Performance Graded Bituminous Pave
- Performance Graded Bituminous Pave
- PVC Deck

• System Selection

1. Use the minimum pipe and strength as shown for the entire system.
2. Use the maximum length of cover to determine the weight and volume of the system elements.
3. Determine the maximum weight and volume of the system elements and compare to the maximum weight and volume of the system elements that can be supported by the structure.
4. Determine the maximum weight and volume of the system elements and compare to the maximum weight and volume of the system elements that can be supported by the structure.
5. Do not use spread, non-reducing concrete pipe greater than 18 inch diameter.
6. Do not show pipes of different types of material to connect each other. Use matching materials to make direct connections of existing pipes.
7. Do not use pipe containing long pieces of rebar or aggregate pipe or aggregate pipe as required.
8. Do not use thermoplastic systems substituted without UV stabilizers approved by the Approved Engineer in specifications, subject to the following:

III. Execution

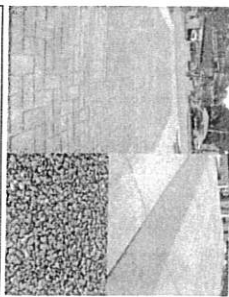
• Details

- Excavate the trench sufficiently wide, deep and clean to place the proposed pipe (leave excess).
- At the proper depth, place the flow line at the bottom of the trench, the slope shall be wide and level to provide the person later to be shown the exact slope.
- Check the trench is in place and is supported in place. The drain can be installed on the trench when in place of the pipe.
- Complete the operation for each system of the system.
- Connect the same system and or down to the same pipe size.
- Install and connect in place (1/2 inch to 1/2 inch) to 1/2 inch.
- **Perforated pipe**
 - Excavate the trench sufficiently wide, deep and clean to place the proposed pipe (leave excess).
 - Place cover pipe beneath the trench, the slope shall be wide and level to provide the person later to be shown the exact slope.
 - Place the cover pipe beneath the trench, the slope shall be wide and level to provide the person later to be shown the exact slope.
 - Place the cover pipe beneath the trench, the slope shall be wide and level to provide the person later to be shown the exact slope.
- **Flow line**
 - Excavate the trench sufficiently wide, deep and clean to place the proposed pipe (leave excess).
 - Place cover pipe beneath the trench, the slope shall be wide and level to provide the person later to be shown the exact slope.
 - Place the cover pipe beneath the trench, the slope shall be wide and level to provide the person later to be shown the exact slope.
 - Place the cover pipe beneath the trench, the slope shall be wide and level to provide the person later to be shown the exact slope.
- **Bedfill and compact** on every trench to 1/2 inch to 1/2 inch.

End of System

Storm Water – Low Impact Development (LID) Recommended Practices and Details

6. Permeable Pavement and Pavers – LID-06

<p>Brief Description</p> <p>Permeable pavement allows stormwater runoff to infiltrate through surface voids into the subgrade, reducing runoff volume and peak flow. Permeable pavement systems are porous concrete, porous asphalt, and permeable interlocking concrete pavers (PICP). Permeable pavements reduce subsurface imperviousness between impervious roads, driveways, and parking lots. Permeable pavements are made of porous concrete, porous asphalt, and porous interlocking concrete pavers. Permeable pavements are made of porous concrete, porous asphalt, and porous interlocking concrete pavers. Permeable pavements are made of porous concrete, porous asphalt, and porous interlocking concrete pavers.</p>	
<p>Cost Range:</p> <p>Construction: \$5-\$55</p> <p>O&M: \$5</p>	<p>Downloads</p> <p>http://www.mhfiwatermanagement.com/Products/Permeable-Pavement/Permeable-Pavement-Details/Permeable-Pavement-Details.aspx</p> <p>http://www.mhfiwatermanagement.com/Products/Permeable-Pavement/Permeable-Pavement-Details/Permeable-Pavement-Details.aspx</p>
<p>Ideal Conditions for Installation</p> <p>Precipitation: Suitable for most storm events</p> <p>Soils: Works well in A & B soils with no or very little clay content. Not suitable for C & D soils with an impervious layer.</p> <p>Groundwater: 3 foot separation from bottom of permeable pavement reservoir to seasonal high water table.</p>	<p>Links</p> <p>http://www.mhfiwatermanagement.com/Products/Permeable-Pavement/Permeable-Pavement-Details/Permeable-Pavement-Details.aspx</p> <p>http://www.mhfiwatermanagement.com/Products/Permeable-Pavement/Permeable-Pavement-Details/Permeable-Pavement-Details.aspx</p> <p>http://www.mhfiwatermanagement.com/Products/Permeable-Pavement/Permeable-Pavement-Details/Permeable-Pavement-Details.aspx</p>
<p>Where/Applicability</p> <p>Residential: Yes</p> <p>Commercial: Yes</p> <p>Ultra Urban: Yes</p> <p>Industrial: Limited to areas with low to moderate pollutant loading potential</p> <p>Highway/road: Yes, for improved base areas</p> <p>Notes: No, for replacement of surface impervious when used</p> <p>Feasible: do not use when water table is less than 4 feet deep, do not use over impervious pan</p>	<p>Specifications</p> <p>Pre-treatment is recommended to remove sediments and floatables.</p> <p>Follow manufacturer recommendations for any specific proprietary products.</p> <ol style="list-style-type: none"> Excavate carefully to avoid subgrade compaction Excavate as flat as possible Excavation should work from the sides, outside the footprint of the infiltration area Subgrade should be excavation at least 3 feet above seasonal water table Keep at least a 10 foot setback from all structure foundations Maintain appropriate setbacks from wall weirs, (100 foot minimum for culinary work, 50 foot from other weirs) Specialize use feet/curb between native soils and stone subbase Compact stone subbase (primarily no. 57 sized aggregate) with roller until there is no visible movement of the aggregate May need a graded material between pavement and aggregate Install pervious concrete or pervious asphalt according to manufacturer's recommendations
<p>Maintenance</p> <p>Frequency: Quarterly at first, adjust as needed</p> <p>Type: Weeding</p> <p>Monitoring: Visual observation, test to drain surface</p> <p>Permit Renewal: No permit needed</p>	<p>Performance:</p> <p>Reduces suspended solids (TSS): High</p> <p>Chloride: Medium</p> <p>Total Nitrogen (TN): High in solid form, Medium in dissolved</p> <p>Metals: High</p> <p>Grease: High</p> <p>Pathogens: High</p> <p>Phosphorus: High</p>
<p>Construction Sequence</p> <p>Follow manufacturer recommendations for any specific proprietary products.</p> <ol style="list-style-type: none"> Remove all debris Rough grade site where permeable pavement is to be constructed Excavate carefully to bottom of subbase, bottom of concrete Excavation should be flat Place geotextile between native soils and stone subbase Place and compact stone subbase Top subbase with bedding or choker base for finished pavement as needed Install surface layer of pervious concrete or asphalt according to manufacturer's recommendations 	

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7. Post-Construction Inlet Protection/Filters - LID-07

The Post-Construction Inlet Protection BMP/Filter provides a permanent method of removal of some pollutants for any storm drain inlet. This system will capture and collect some pollutants, according to the filter design, before they enter the stormwater conveyance system.

Cost Range:
Construction: \$5
O&M: \$5

Ideal Conditions for Installation
Precipitation: All
Soils: N/A
Groundwater: N/A

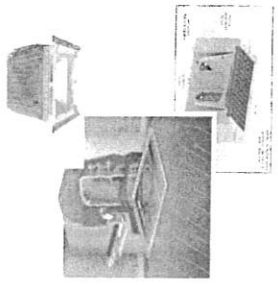
Where/Applicability
Residential: Yes
Commercial: Yes
Urban Urban: Yes
Highway/Road: Yes
Retrofit: Yes
Feasible: most inlets

Maintenance
Frequency: Quarterly or depending on the stormwater pollutant type and loading
Type: Vacuuming, emptying or replacement
Monitoring: Quarterly inspections or as needed
Performance: 80% to 95%

Performance:
TSS: 80% to 95%
Chloride: N/A
NH₃: None
Oil and Grease: Up to 95% with additional pollutants.
None

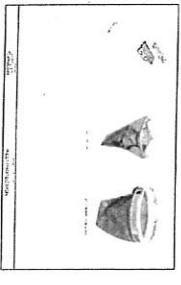
Construction Sequence

1. This is taken from the dry/wet well notes and is to be deleted!
2. Stormwater infrastructure has been completely installed
3. Determine pollutant loading and add applicable filter bag add-ons.
4. Remove existing stormwater grate.
5. Install inlet-protection frame.
6. Suspend inlet protection bag from installed frame and install pollutant specific add-ons.
7. Replace stormwater grate.



<https://www.lidfilters.com/engineering-resources>
<https://www.lidfilters.com/engineering-resources>

- Specifications**
(This is taken from the dry/wet well notes and it to be deleted)
1. Install at least down-gradient of areas of potential pollutant loading.
 2. Use only drop-down bag style inlet protection that do not protrude above the stormwater grate.
 3. Provide minimum 12" filter bag depth.
 4. Provide filter bag material that will allow water to pass at the a minimum of 20 gpm while filtering TSS at 95% removal rate.
 5. Provide maintenance per manufacturer's recommendations.



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8. Hydrodynamic Separators – LID-08

<p>Final description: The Hydrodynamic Separator (HDS) is a Best Management Practice (BMP) that uses the energy of the stormwater and the slope of the pipe to separate some pollutants from the runoff. The HDS is designed to capture and retain sediment, debris, and other floatables. Hydrodynamic devices are typically designed to provide optimal removal efficiency for smaller, more frequent storms, which prevent removal of larger, less common storms.</p>	<p>Cost Range: Construction: \$\$\$ O&M: \$5</p>	<p>Ideal conditions for installation: Pre-conditions: Similar, more frequent storms Soils: NA Geology: Depends on the manufacturer</p>	<p>Water/Applicability: Residential: Yes Commercial: Yes Industrial: Yes Highway/Road: Yes Airport: Yes The separator should be placed in the storm drain before the stormwater enters the storm drain system or before it enters into a different system.</p>	<p>Maintenance: Frequency: Quarterly to monthly Type: Manual Monitoring: Visual inspection Alerting: None Permit Renewal: No Renew amount of sediment collected</p>	<p>Performance: Total Suspended Solids (TSS): Medium Chloride: N/A Total Nitrogen (TN): N/A Total Phosphorus (TP): Medium Oil and Grease: Medium Pathogens: Low</p>	<p>Construction sequence: 1. Excavate and install of needed structural foundation, walls, well, etc. as needed or part of the stormwater control system. 2. The connecting pipes, valves, and venting the units normally require wet-put connections. Follow manufacturer recommendations for these connections. 3. For any openings being made, the loading capacity should be noted for different loading conditions. The design should be at least 6" over the crown of the separator unit, but in no way less than the specified amount of cover per the manufacturer specifications or the engineer requirements. 4. Reference the site plan to determine the location of the separator unit system. Determine the separator configuration, sheet dimensions if the unit is proprietary, and verify to accommodate the flow direction. 5. Follow the manufacturer's instructions as provided by the supplier for connection, parts, etc. 6. Excavate to proper depth, length, and width in accordance with requirements to ensure safe conditions. 7. Level substrate to the proper elevation and check against finished grade and structure dimensions to ensure adequate depth. 8. Determine the unit should be backfilled with Class II or III material to the depth indicated above the crown of the unit, or as specified for traffic-carrying situations. 9. Install to grade using Class II or III backfill or other suitable material. Compact the backfill according to geotechnical recommendations.</p>		<p>Downloads:</p> <p>Links: http://www.danforth.com/form/matic http://www.danforth.com/form/matic http://www.danforth.com/form/matic http://www.danforth.com/form/matic http://www.danforth.com/form/matic http://www.danforth.com/form/matic</p>	<p>Specifications: 1. The separator shall be recommended to remove sediments and floatables. 2. The separator shall be sized to either achieve an 80 percent average annual reduction in the total suspended solid load or project is located. Such methods should be sized using a particle size distribution having a mean particle size (d₅₀) of 120 microns unless otherwise stated. 3. The separator shall be capable of capturing and retaining 100 percent of pollutants greater than or equal to 2.4 milligrams (mg)/liter (mg/L) of the pollutant's specific gravity or flow up to the device's rated treatment capacity. 4. The separator shall be designed to retain all previously captured pollutants, addressed by this subsection, under all operating conditions, and shall be capable of detaching and allowing such pollutants to pass through. 5. The separator shall be capable of achieving a removal efficiency of 92 and 70 percent when the device is operating at 20 and 40 percent of its rated treatment capacity, respectively. Removal efficiencies shall be based on independent laboratory research for influent oil concentrations representative of storm water (total oil 2.5 mg/L). 6. The separator shall be greater than 90 percent effective in controlling dry-weather accidental spillage. 7. In order to not restrict the Owner's ability to maintain the separator, the minimum dimension provided shall be 18 inches in diameter. 8. The separator shall be designed to capture and retain Total Petroleum Hydrocarbons generated by wastewater flow and dry-weather gas spill. 9. The separator shall ensure the flow from the peak storm event of the drainage removal, in accordance with required hydraulic capture conditions, is defined by the Engineer. 10. The separator shall have captured and held storm following flow rate in provided requirements.</p>
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**Storm Water – Alternative Design Possibilities (ADP)
Recommended Practices and Details**

9. Outlets Skimmers or Strouds (pre-treatment) – LID-09

<p>Brief Description A skimmer or stroud is typically a hooded device (see drawing) that is located over the outlet pipe in a storm drain structure with a deep sump that can help prevent floatables, sediments, and other trash debris from entering the outlet pipe.</p>	
<p>Cost Range: Construction: \$-55 O&M: \$5</p>	
<p>Best Conditions for Installation Soil: No Groundwater: Lower than the storm drain structure and inlet and outlet pipes</p>	
<p>Water Availability Residential: Yes Commercial: Yes Ultra Urban: Yes Industrial: Yes Highway/Board: Yes Recreation: Yes</p>	
<p>Maintenance: Type: Monthly and after 25 storm events Sediment, silt, and trash Monitoring: Inspect amounts of material collected Permit/Review: NA</p>	
<p>Performance: Chloride: Low to medium Total Nitrogen (TN): N/A Total Phosphorus (TP): N/A Metals: Low Oils and grease: Low (can be high with location filters of sand) Pathogens: Low Fragible trash and debris: High Feasibility: Any outlet structure</p>	
<p>Installation Sequence 1. Ensure storm drain structure is cleaned and prepared for skimmer installation. 2. Trial fit the skimmer over the outlet pipe to ensure proper fitting per specifications. 3. Drill holes for anchor shields. 4. Place blocks on the skimmer flanges and bolt skimmer to wall with minimal surface disturbance. 5. Attach skimmer and accessories (i.e. screens, skirts, deflectors) per manufacturer's recommendations.</p>	<p>Specifications Below are general specifications that may vary depending on the type, size, shape and manufacturer of skimmer and structure.</p> <ol style="list-style-type: none"> 1. Skimmer materials may vary depending on manufacturer. 2. All hoods shall be equipped with watertight access ports, a mounting flange, and an anti-siphon vent pipe and allow as shown on manufacturer's drawing. 3. The size and position of the hood shall be determined by (outlet size shall be larger than pipe size). 4. The bottom of the hood shall extend downward a minimum distance equal to the skimmer diameter with a minimum distance of 5" for pipes <12" ID. 5. The anti-siphon vent shall extend above hood by minimum of 3" and a maximum of 12" according to structure configuration. 6. The surface of the structure where the hood is mounted shall be finished flush to wall. 7. All structure joints shall be watertight. 8. The hood shall be securely attached to structure wall with 3/8" stainless steel bolts and oil-resistant gaskets as supplied by manufacturer. Install per manufacturer instructions. 9. Skimmer depth shall be 3x minimum for up to 12" ID pipe outlet. For pipes 15" ID and above, skimmer depth of 2.5 to 3 times pipe ID recommended.
<p>Downloads</p> <p>https://www.hydro-geo.com/assetmanager/getattachment/1009/24/100901.pdf</p>	

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10. Particulate filtration systems – LID-10

	<p>Brief Description Particulate filtration devices allow stormwater to pass through filter media which are designed to reduce specific sediment production, but primarily also to reduce turbidity. Particulate are captured physically, or through adsorption, and are held in place by the filter media. Particulate are removed into existing catch basins or manholes, and also provide additional treatment. Particulate filtration devices are available in a variety of configurations and are typically installed in catch basins or manholes. They are typically installed in catch basins or manholes. They are typically installed in catch basins or manholes. They are typically installed in catch basins or manholes.</p>
<p>Cost Range: \$55 ORM: \$55</p>	<p>Ideal Conditions for Installation Application: (Typical) designed for 30% storm or less runoff from impervious surfaces. Soils: (sand, silt or clayey soil) Groundwater: (1-3 feet below the bottom of filter system)</p>
	<p>Where Applicable Residential: (Yes) Commercial: (Yes) Ultra Urban: (Yes) Industrial: (Yes) Program/Road: (Yes) Reg. City: (Yes)</p>
	<p>Maintenance Frequency: (With pretreatment: 4-5 year; Without pretreatment: annually) Type: (Yes: Truck, Filter media replacement; No: None) Monitoring: (Visual inspection) Permit Required: (Varies by permit.)</p>
	<p>Performance: Total Suspended Solids (TSS): (High) Chloride: (Medium/High depending on media) Total Nitrogen (TN): (Low/High depending on media) Metals: (Low/High depending on media) Oil and Grease: (Medium/High depending on media) Pathogens: (Medium/High depending on media) Filter media:</p>
	<p>Construction Sequence 1. Install pretreatment device 2. Install catch basin or manhole 3. Install initial base course of gravel or filter media 4. Install pipe network of chambers and interconnecting pipes 5. Install remaining gravel and filter media 6. Cover entire area with filter cloth 7. Install necessary ground cover (pavement, top soil and seed)</p>
	<p>Proprietary sample</p> 
	<p>Non-proprietary sample</p> 
	<p>Downloads https://www.walcoinc.com/Stormwater-manual-unit https://www.walcoinc.com/Stormwater-manual-unit https://www.walcoinc.com/Stormwater-manual-unit</p>
	<p>Links https://www.walcoinc.com/Stormwater-manual-unit https://www.walcoinc.com/Stormwater-manual-unit https://www.walcoinc.com/Stormwater-manual-unit</p>
	<p>Specifications Performance is recommended to remove sediments and turbidity. 1. Follow the manufacturer recommended requirements for installation, operation and maintenance. 2. Include inspection and maintenance ports to make it easy to inspect and maintain the filtration device. 3. Filter cloth should be replaced with a hydraulic flow rate of at least 100 gpm/ft². 4. Liner material should be a minimum of 20 mil polyethylene. 5. Gravel should be clean/washed with no more than 5% fines. 6. Intentional aggregate is not acceptable.</p>

SENSITIVE AND PROTECTED AREAS NOTES:

1. STORM DRAIN RETENTION BASINS OR INFILTRATION BASINS CANNOT BE PLACED IN THE AREAS SHOWN IN RED. RETENTION OR INFILTRATION BASINS MAY BE PLACED IN THE AREAS SHOWN IN YELLOW IF APPROVED BY THE CITY ENGINEER AND ARE PROTECTED WITH AN OUTLIER SPREADING AREA.
2. STORM DRAIN RETENTION BASINS OR INFILTRATION BASINS CANNOT BE PLACED IN AREAS DESIGNATED AS A FLOOD FLOOD PLAIN.

- LEGEND:**
- CITY BOUNDARY
 - ▨ SHADING WITH SQUARE RECHARGE ZONE - RETENTION OR INFILTRATION MAY BE ALLOWED IF APPROVED BY THE CITY ENGINEER
 - ▨ NO RETENTION OR INFILTRATION ALLOWED IN THIS ZONE - SHADING WITH SQUARE RECHARGE ZONE 1 & 2
 - ▨ SHADING WITH DIAGONAL RECHARGE ZONE 3 & 4
 - ▨ SOILS TYPE A
 - ▨ SOILS TYPE B
 - ▨ SOILS TYPE C
 - ▨ SOILS TYPE D
 - ▨ FLOOD FLOOD ZONE A
 - ▨ FLOOD FLOOD ZONE A2

