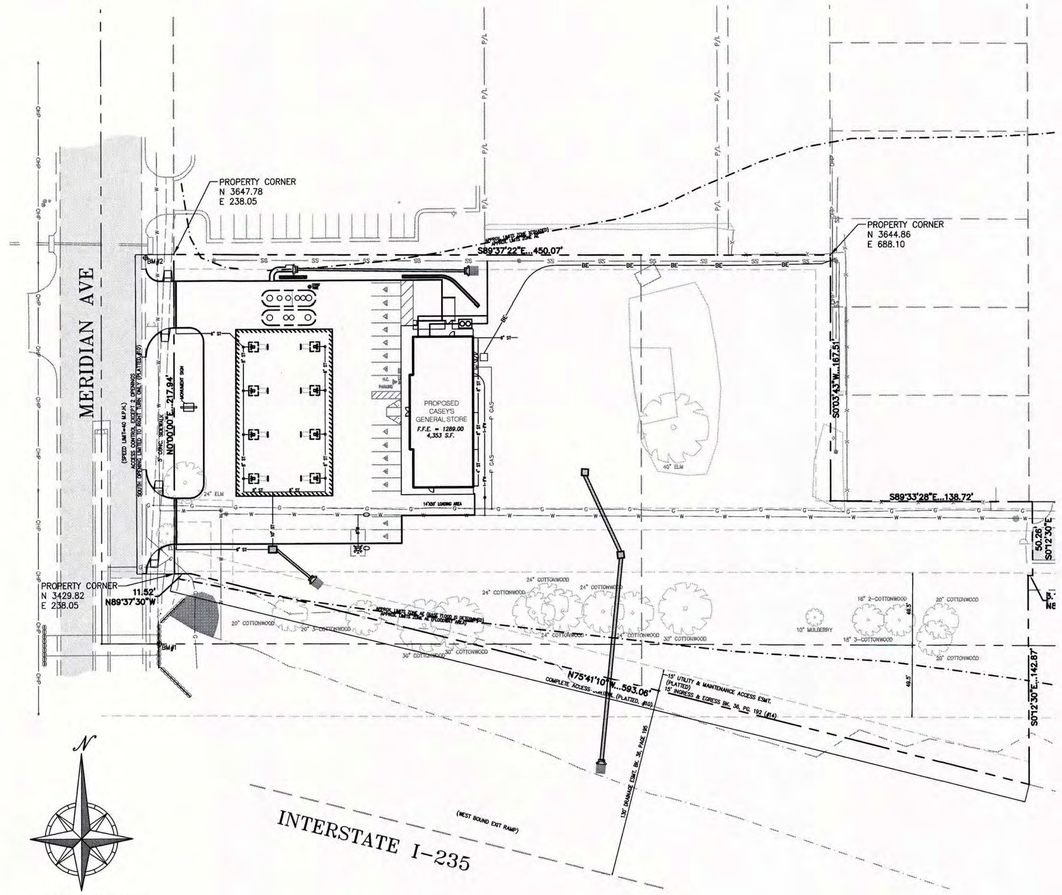
STORM SEWER PLANS
FOR
CASEY'S GENERAL STORE
3540 S MERIDIAN AVE
IN THE CITY OF WICHITA, SEDGWICK COUNTY, KANSAS
PROJECT NUMBER 07 17 PPD (607861)



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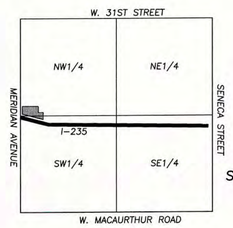

SCALE: 1"=2000'

VICINITY MAP
SEC. 7-28S.-1E.

INDEX

D1	COVER
D2	DRAINAGE MAP
D3	STORM SEWER PLAN & PROFILE
D4–D6	STORM SEWER DETAILS

APPROVED AS NOTED
BY CITY ENGINEER OF WICHITA

Engineering Julianne Kallman 5-29-13

Stormwater 06-04-13

NOTE TO CONTRACTORS

Inspection and testing for this project are to be provided by a Licensed Consulting Engineering Firm under contract with the Owner/Developer. Said Inspection to be in accordance with the City of Wichita standard construction engineering practices and certified by a Licensed Professional Engineer. No work shall be performed in dedicated easements or public right-of-way by the Contractor without such Inspection, nor shall any work be commenced without written authorization by the City Engineer.

LEGAL DESCRIPTION:

LOTS 1 AND 2, BLOCK A, SCHRAFT 5TH ADDITION, WICHITA, SEDGWICK COUNTY, KANSAS.

NET AREA = ±3.35 ACRES

BENCHMARK:

1. SET "□" CUT ON CENTER OF HEADWALL SOUTH OF THE SOUTHWEST CORNER OF PROJECT.
   ELEVATION = 1285.89
2. PROJECT BENCH MARK AS SHOWN ON PLAT, FOUND "□" CUT ON TOP OF EAST CURB OF MERIDIAN OPPOSITE THE N.W. CORNER OF LOT 1, SCHRAFT 5TH ADDITION.
   ELEVATION = 1284.07 NAVD88

FLOOD NOTE:

A PORTION OF THIS PROPERTY LIES WITHIN ZONE AE, DEFINED AS SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD.

A PORTION OF THIS PROPERTY LIES WITHIN ZONE X(SHADED), DEFINED AS AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEWEES FROM 1% ANNUAL CHANCE FLOOD, AS SHOWN ON THE FLOOD INSURANCE RATE MAP PREPARED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY FOR THE CITY OF WICHITA, COMMUNITY NO. 200321, SEDGWICK COUNTY, KANSAS, MAP NO. 20173C0365E, AND DATED FEBRUARY 2, 2007.

UTILITY COMPANIES:

CITY OF WICHITA PUBLIC WORKS CITY OF WICHITA WATER UTILITIES CITY HALL, 8TH FLOOR WICHITA, KS 67202	(316) 268-4422 (316) 265-1300
BLACK HILLS ENERGY 110 EAST 9TH STREET LAWRENCE, KS 66044	(888) 890-5554
KANSAS GAS SERVICE 7421 W. 129TH STREET OVERLAND PARK, KS 66213	(800) 794-4780
WESTAR ENERGY PO BOX 208 WICHITA, KS 67201-0208	(800) 401-5666
AT&T BIRCH COMMUNICATIONS COX COMMUNICATIONS	(888) 944-0447 (866) 238-7041 (800) 620-6196

OTHER UTILITIES
HTTP://WWW.WICHITA.GOV/RESIDENTS/LINKS/UTILITIES.HTM

AS BUILTS

Contractor:	Project Inspector:
Utilities Plus 03/13/2014	Tom Jones KEMILLER ENGINEERING PA 117 E. Lewis, Wichita, KS 67202 (316)264-0242

VISUAL INDICATIONS OF UTILITIES ARE AS SHOWN. UNDERGROUND LOCATIONS SHOWN, AS FURNISHED BY THEIR LESSERS, ARE APPROXIMATE AND SHOULD BE VERIFIED IN THE FIELD AT THE TIME OF CONSTRUCTION. FOR ACTUAL FIELD LOCATIONS OF UNDERGROUND UTILITIES: CALL 1-800-344-7233, KANSAS

Consultant Information:
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License Number: 18824
Licensed As: Professional Engineer
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JEFFREY WAYNE LAUBACH LICENSED 18824 5/23/13 KANSAS PROFESSIONAL ENGINEER

Project: Wichita, Kansas 'O2' Style Store

Location: NE Corner of S. Meridian Ave. & I-235 Wichita, Kansas

Publication Date: 05.22.13
With Revisions On:

PERMIT PLANS

Sheet Information: COVER SHEET

D1

CASEY'S CONSTRUCTION DIVISION
One Convenience Blvd, Ankeny, IA 50021
Phone: 515-965-6100

PEI NO. 120730

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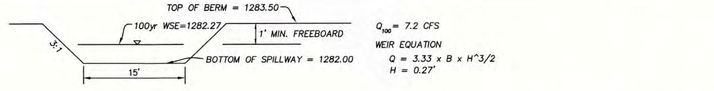
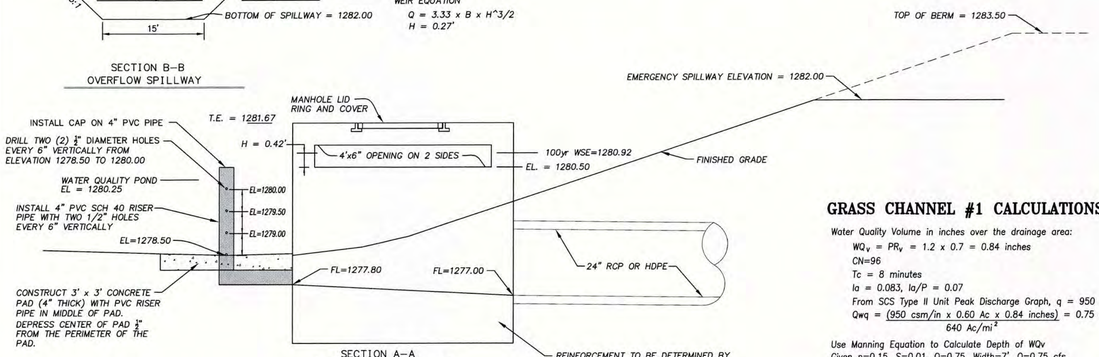


Q_{100} = 7.2 CFS

WEIR EQUATION
$Q = 3.33 \times B \times H^{3/2}$
$H = 0.27'$

SECTION B–B
OVERFLOW SPILLWAY



SECTION A–A
OUTFALL STRUCTURE #20
EXTENDED DRY DETENTION BASIN #1

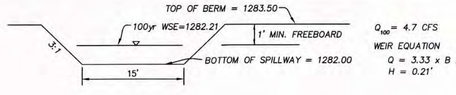
Q_{100} = C x 10.32 in/hr x Area
Q_{100} = 0.8 x 10.32 in/hr x 0.87 Ac = 7.2 CFS

WEIR EQUATION
$Q = 3.33 \times B \times H^{3/2}$
2 Openings –> Q Per Openings = 7.2/2 = 3.6 CFS
$H = 0.42'$

GRASS CHANNEL #1 CALCULATIONS

Water Quality Volume in inches over the drainage area:
$WQ_v = PR_v = 1.2 \times 0.7 = 0.84$ inches
CN=96
Tc = 8 minutes
Ia = 0.083, Ia/P = 0.07
From SCS Type II Unit Peak Discharge Graph, q = 950 csm/inch
$Qwq = \frac{(950 \text{ csm/in} \times 0.60 \text{ Ac} \times 0.84 \text{ inches})}{640 \text{ Ac/mi}^2} = 0.75$ cfs

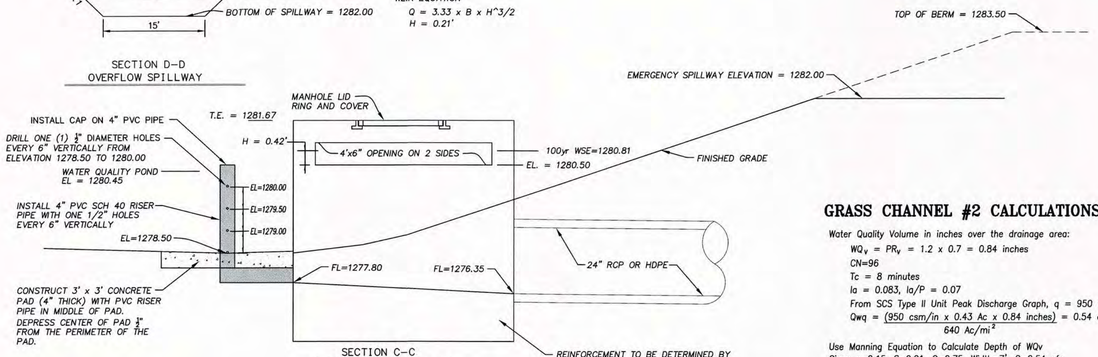
Use Manning Equation to Calculate Depth of WQv
Given n=0.15, S=0.01, Q=0.75, Width=7', Q=0.75 cfs
D=0.26' which is less than the maximum 0.33' OK
Velocity = 0.41 ft/s , less than 1 ft/s OK
Minimum length for 5 minute residence time:
L=V x T = 0.41 x 5 x 60 = 123 LF
125 LF Provided, OK



Q_{100} = 4.7 CFS

WEIR EQUATION
$Q = 3.33 \times B \times H^{3/2}$
$H = 0.21'$

SECTION D–D
OVERFLOW SPILLWAY



SECTION C–C
OUTFALL STRUCTURE #21
EXTENDED DRY DETENTION BASIN #1

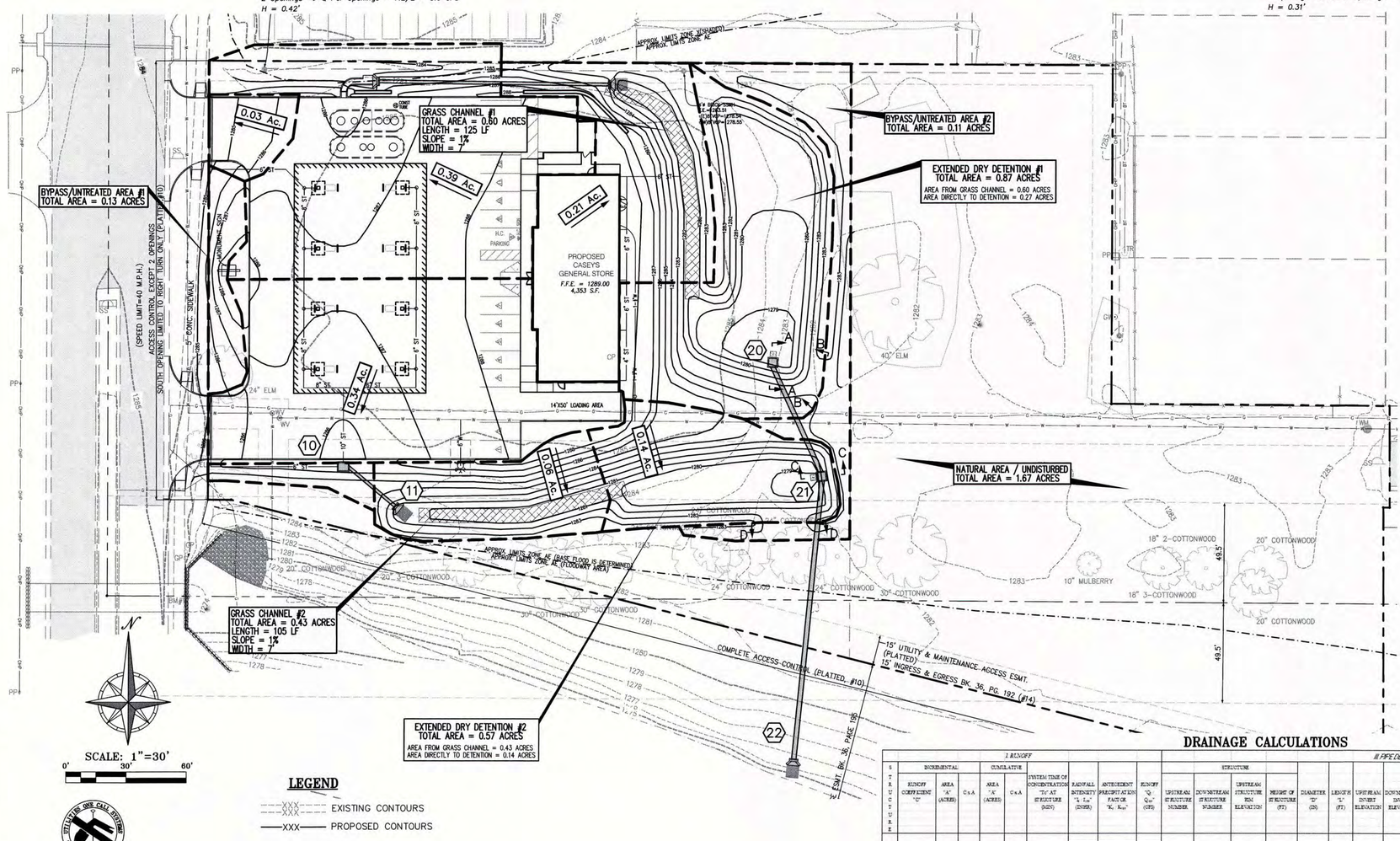
Q_{100} = C x 10.32 in/hr x Area
Q_{100} = 0.8 x 10.32 in/hr x 0.57 Ac = 4.7 CFS

WEIR EQUATION
$Q = 3.33 \times B \times H^{3/2}$
2 Openings –> Q Per Openings = 4.7/2 = 2.35 CFS
$H = 0.31'$

GRASS CHANNEL #2 CALCULATIONS

Water Quality Volume in inches over the drainage area:
$WQ_v = PR_v = 1.2 \times 0.7 = 0.84$ inches
CN=96
Tc = 8 minutes
Ia = 0.083, Ia/P = 0.07
From SCS Type II Unit Peak Discharge Graph, q = 950 csm/inch
$Qwq = \frac{(950 \text{ csm/in} \times 0.43 \text{ Ac} \times 0.84 \text{ inches})}{640 \text{ Ac/mi}^2} = 0.54$ cfs

Use Manning Equation to Calculate Depth of WQv
Given n=0.15, S=0.01, Q=0.75, Width=7', Q=0.54 cfs
D=0.22' which is less than the maximum 0.33' OK
Velocity = 0.35 ft/s , less than 1 ft/s OK
Minimum length for 5 minute residence time:
L=V x T = 0.35 x 5 x 60 = 105 LF
105 LF Provided, OK



LEGEND

XXX EXISTING CONTOURS
XXX PROPOSED CONTOURS

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SITE SUMMARY

Area of Lot	3.35 Acres	
Amount of Impervious Area	0.76 Acres	–> Less than 1 Acre therefore, No Detention Required
Disturbed Area	1.8 Acres	–> Greater than 1 Acre therefore, BMPs Required

TOTAL TSS REMOVAL CALCULATIONS

	% TSS REMOVAL	Drainage Area (Acres)	% TSS REMOVAL x Area
Grass Channel #1 / Dry ED Pond #1	80%	0.60	0.48
Dry ED Pond #1	60%	0.27	0.16
Grass Channel #2 / Dry ED Pond #2	80%	0.43	0.34
Dry ED Pond #2	60%	0.14	0.08
Natural Area (Area Undisturbed)	100%	1.67	1.67
By-Pass / Untreated Area	0%	0.24	0.00
Total		3.35	2.73
		Total % TTS Removal (2.73 / 3.35)x100	81.5%

Minimum 80% TTS Removal Required

Treatment Drain % TSS Removal Calculations for Grass Channel to Dry ED Pond (50% for Grass Channel and 60% for Dry ED Pond)

$TSS_{total} = TSS_A + TTS_B - \frac{(TSS_A * TTS_B)}{100} = 50+60 - \frac{(50 * 60)}{100} = 80\%$

EXTENDED DRY DETENTION #1 CALCULATIONS

Drainage Area=	0.87	Acres
Rv=	0.7	
P=	1.2	inches
WQv=	0.0609	Ac-ft
	2653	Cubic feet
Water Quality Pond Elevation=	1280.25	

Elevation	Area (SF)	Volume (Cubic Feet)	Discharge (cfs)	Incremental Volume (ft^3)	Average Discharge (cfs)	Incremental Drawdown Time (Hours)	Drawdown Time for Approx. 90% Volume (Hours)
1278.50	0	0	0.00000				
1278.75	195	24	0.00629	24	0.00314	2.2	
1279.00	760	144	0.00909	119	0.00769	4.3	
1279.25	1150	383	0.01750	239	0.01329	5.0	
1279.50	1570	723	0.02208	340	0.01979	4.8	
1279.75	2155	1188	0.03206	466	0.02707	4.8	24.8
1280.00	2950	1826	0.03805	638	0.03505	5.1	
1280.25	3660	2653	0.04932	826	0.04369	5.3	
1280.50	4575	3682	0.05652	1029	0.05292	5.4	
1280.75	4935	4871	0.06264	1189	0.05958	5.5	
1281.00	5280	6148	0.06811	1277	0.06537	5.4	

EXTENDED DRY DETENTION #2 CALCULATIONS

Drainage Area=	0.57	Acres
Rv=	0.7	
P=	1.2	inches
WQv=	0.0399	Ac-ft
	1738	Cubic feet
Water Quality Pond Elevation=	1280.45	

Elevation	Area (SF)	Volume (Cubic Feet)	Discharge (cfs)	Incremental Volume (ft^3)	Average Discharge (cfs)	Incremental Drawdown Time (Hours)	Drawdown Time for Approx. 90% Volume (Hours)
1278.50	0	0	0.00000				
1278.75	60	8	0.00314	8	0.00157	1.3	
1279.00	225	43	0.00454	36	0.00384	2.6	
1279.25	695	158	0.00875	115	0.00665	4.8	
1279.50	905	358	0.01104	200	0.00990	5.6	
1279.75	1125	612	0.01603	254	0.01353	5.2	
1280.00	1390	926	0.01903	314	0.01753	5.0	25.7
1280.25	1695	1312	0.02466	386	0.02184	4.9	
1280.50	2125	1789	0.02826	478	0.02646	5.0	
1280.75	2390	2354	0.03132	564	0.02979	5.3	
1281.00	2850	3009	0.03405	655	0.03269	5.6	

DRAINAGE CALCULATIONS

STRUCTURE	I. RUNOFF: INCREMENTAL RUNOFF COEFFICIENT "C"	INCREMENTAL AREA "A" (ACRES)	INCREMENTAL C x A	CUMULATIVE AREA "A" (ACRES)	CUMULATIVE C x A	SYSTEM TIME OF CONCENTRATION "Tc" AT STRUCTURE (MIN)	RAINFALL INTENSITY "I = Ka^x" (IN/HR)	ANTECEDENT PRECIPITATION FACTOR "K, K_{100}"	RUNOFF "Q = CxI" (CFS)	II. PIPE DESIGN: STRUCTURE UPSTREAM STRUCTURE NUMBER	STRUCTURE DOWNSTREAM STRUCTURE NUMBER	STRUCTURE UPSTREAM INVERT ELEVATION	STRUCTURE WEIGHT OF STRUCTURE (FT)	DIAMETER "D" (IN)	LENGTH "L" (FT)	UPSTREAM INVERT ELEVATION	DOWNSTREAM INVERT ELEVATION	SLOPE "S" (FT/FT)	TRAVEL TIME IN PIPE "T" (MIN)	VELOCITY FULL "V" (FPS)	RUNOFF Q (CFS)	RUNOFF Q_{100} (CFS)	FULL FLOW Q (CFS)	REMARKS
10	0.80	0.34	0.27	0.34	0.27	5.00	6.53	1.00	1.8	10	11	1288.25	4.85	15	32.16	1283.40	1281.15	0.0078	0.11	4.7	1.8	2.8	5.7	
							10.32	1.00	2.8															
20	0.80	0.87	0.70	0.87	0.70	5.00	6.53	1.00	4.5	20	21	1281.67	4.67	24	61.58	1277.00	1276.50	0.0065	0.18	5.8	4.5	7.2	18.2	
							10.32	1.00	7.2															
21	0.80	0.57	0.46	1.44	1.15	5.00	6.53	1.00	7.5	21	22	1281.67	5.32	24	140.54	1276.35	1275.50	0.0053	0.44	5.3	7.5	11.9	14.4	
							10.32	1.00	11.9															
30	0.80	0.39	0.31	0.39	0.31	5.00	6.53	1.00	2.0	30	31	NA	NA	15	114.24	1283.00	1282.10	0.0079	0.40	4.7	2.0	3.2	5.7	
							10.32	1.00	3.2															

PEI NO. 120730

AS BUILTS

KEMILLER ENGINEERING PA
117 E. Lewis, Wichita, KS 67202 (316)264-0242

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License Number: 18824
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CASEY'S CONSTRUCTION DIVISION
One Convenience Blvd, Ankeny, IA 50021
Phone: 515-965-6100

Publication Date: 05.22.13
With Revisions On:

PERMIT PLANS

Sheet Information: DRAINAGE MAP

D2

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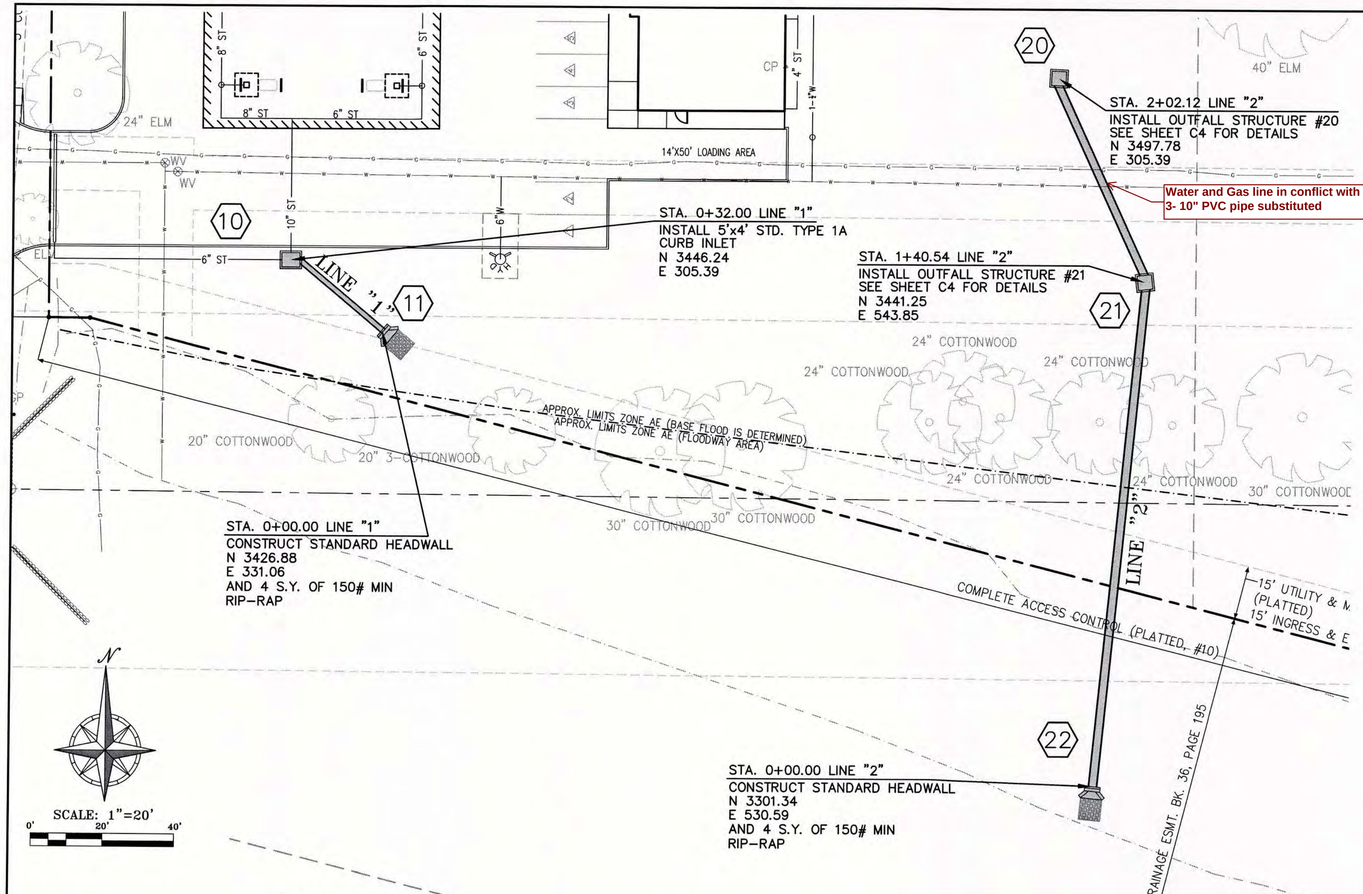
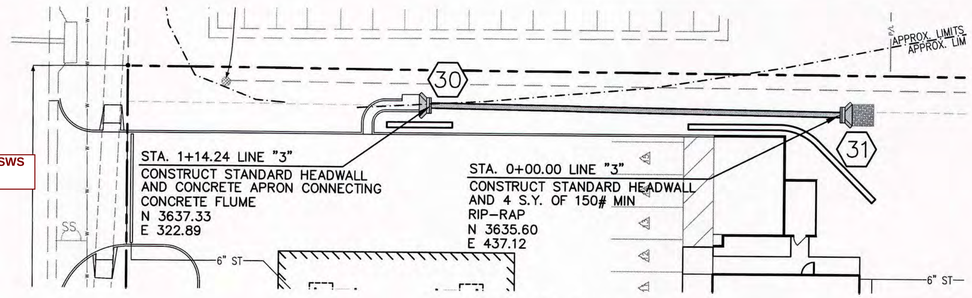
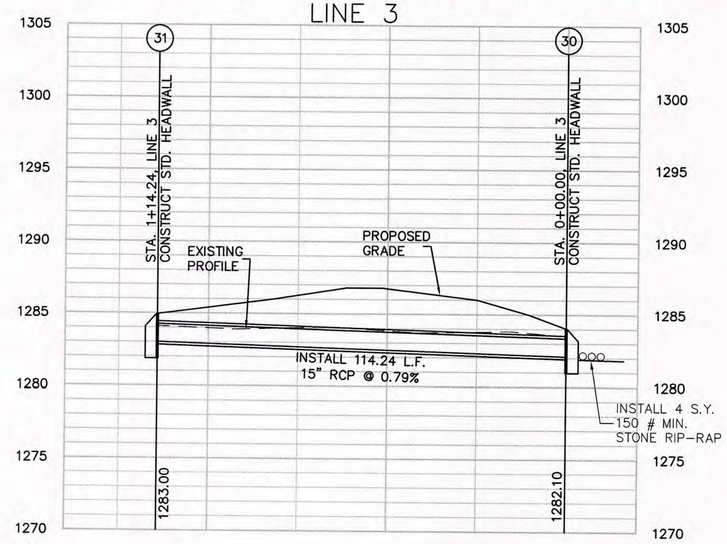
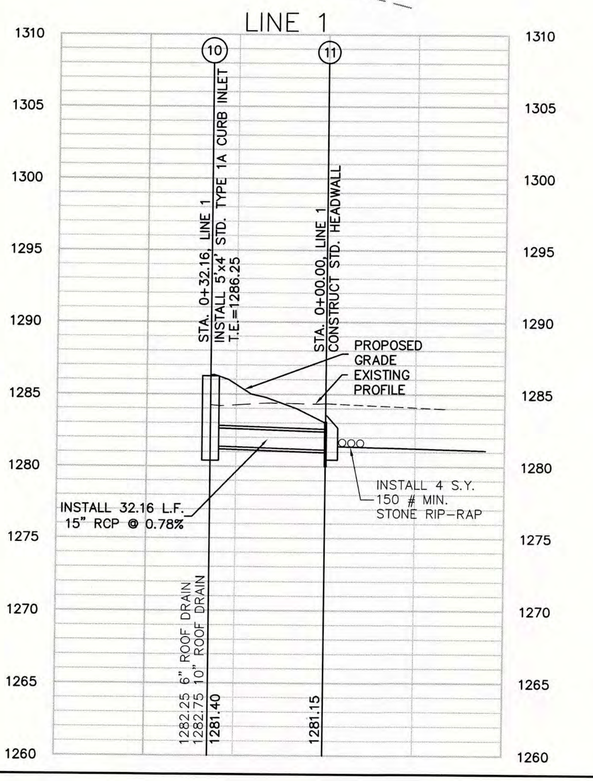
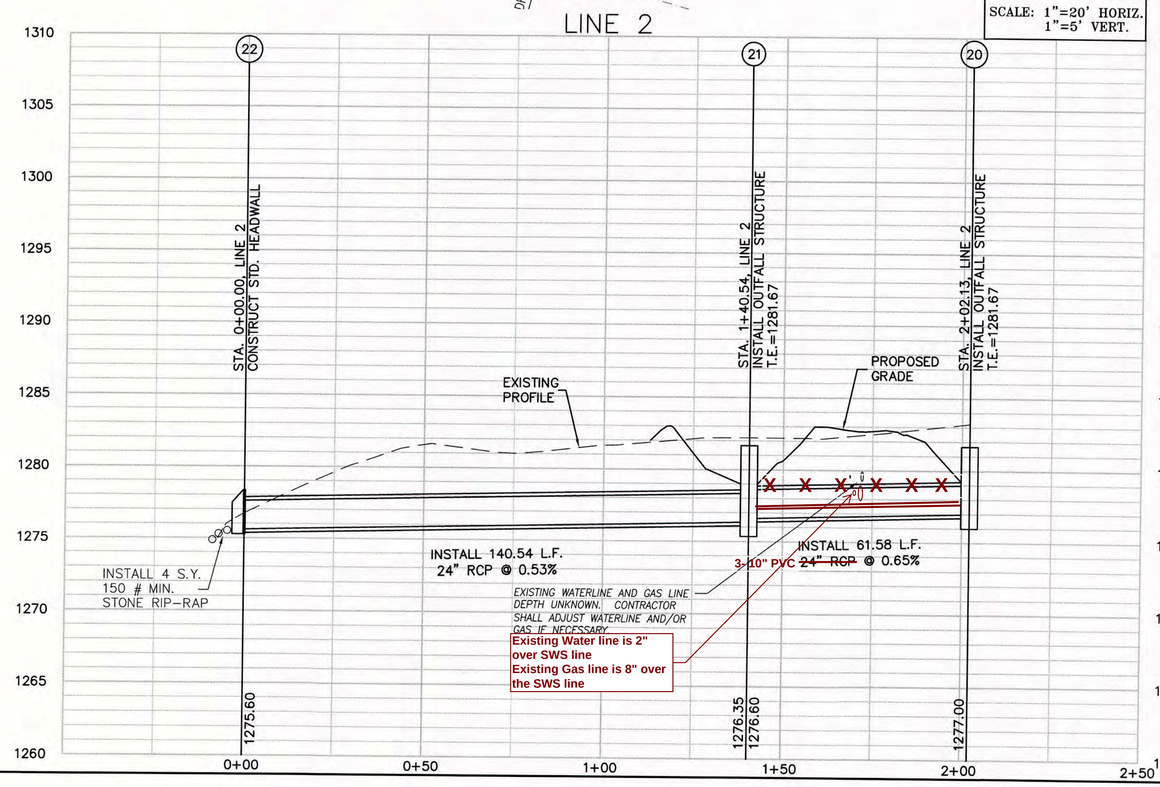






SCALE: 1"=20' HORIZ.
1"=5' VERT.





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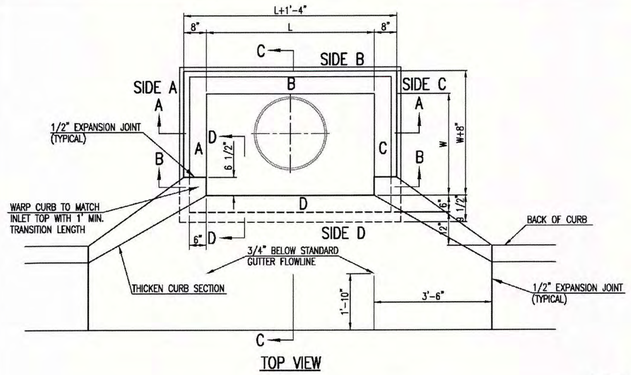


TOP VIEW

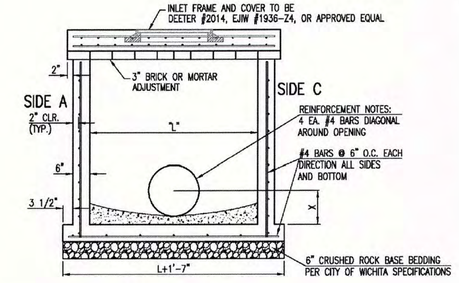
BAR SCHEDULE		
INLET OPENING	B1 BARS	SPACING
5'-0"	#4	4"
10'-0"	#6	3.5"

PRECAST CURB INLET WIDTHS				
W	PRE-CAST TOP SIZE			PIPE DIA.**
	WIDTH	LENGTH	TOP	
3'-0"	W+8"	L+1'-4"	7 1/2"	21" & SMALLER
4'-0"	W+8"	L+1'-4"	7 1/2"	24" & 30"
5'-0"	W+8"	L+1'-4"	7 1/2"	36" & 42"
6'-0"	W+8"	L+1'-4"	7 1/2"	48" & 54"
7'-0"	W+8"	L+1'-4"	7 1/2"	60" & 66"

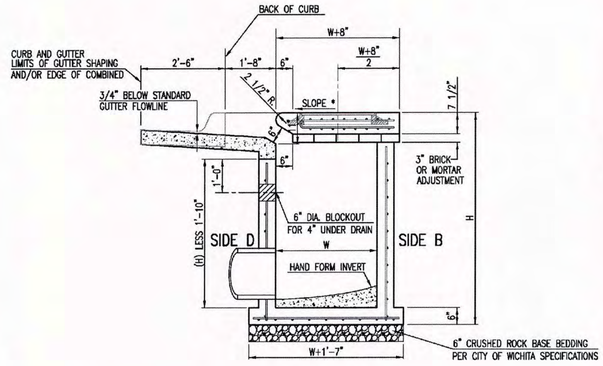
** FOR PIPES PERPENDICULAR TO INLET WALL

GENERAL NOTES

1. CONCRETE TOPS TO BE INSTALLED ON THIN MORTAR CUSHION TO INSURE FULL SUPPORT ALONG BRICK. CONCRETE TOPS MAY BE CAST IN PLACE OR PRECAST. CONCRETE USED FOR INLET CONSTRUCTION SHALL CONFORM TO CITY OF WICHITA SPECIFICATIONS FOR CONCRETE PAVEMENT MIX.
2. CONTRACTOR SHALL HAVE THE OPTION OF CONSTRUCTING 8" BRICK MASONRY WALLS BETWEEN THE CONCRETE INLET BASE AND TOP OF THIS INLET WHEN W=5'-0" AND H=7'-0" OR LESS.
3. INLET INVERT SHALL BE SHAPED WITH 8 SACK SAND MIX CONCRETE TO CREATE FLOW CHANNELS AND TO INCREASE HYDRAULIC EFFICIENCY SUCH THAT THE INLET WILL BE SELF CLEANING BETWEEN ALL INLET AND/OR OUTLET PIPES.
4. THE ENDS OF ALL PIPES INSTALLED IN INLETS SHALL BE CUT OFF FLUSH WITH THE INSIDE FACE OF THE INLET WALL.
5. INLET FRAME AND COVER TO BE DEETER #2014, EJIW #1936-Z4, OR APPROVED EQUAL, SEE SW-303.
6. CONTRACTOR SHALL REMOVE LIFTING HOOKS AFTER INSTALLATION. RECESSES IN INLET WALL SHALL BE GROUTED FLUSH TO THE INLET WALL WITH HYDRAULIC CEMENT AFTER THE INLET IS IN PLACE. LIFTING HOLES THRU THE INLET WALL WILL NOT BE ACCEPTED.

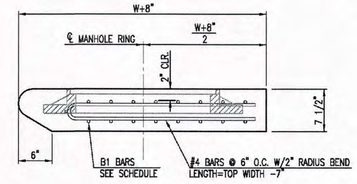


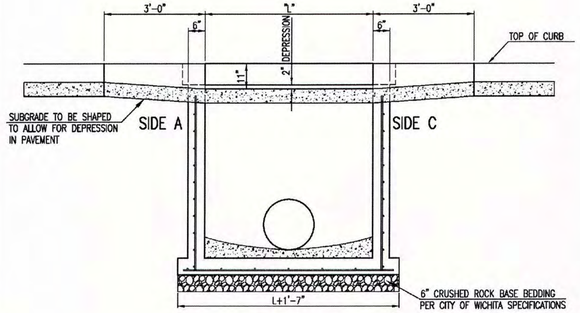
SECTION "A-A"



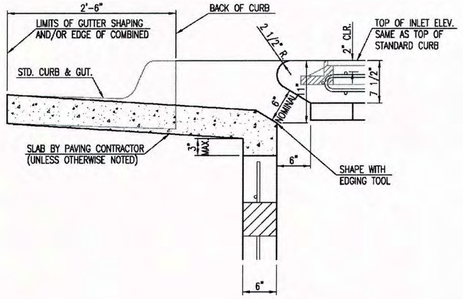
SECTION "C-C"

NOTES:
* SLOPE OF INLET TOP TO MATCH SIDEWALK OR PARKING SLOPES WITHIN LIMITS INDICATED.





SECTION "B-B"



SECTION "D-D"

CITY OF WICHITA
PUBLIC WORKS & UTILITIES ENGINEERING DIVISION

STANDARD TYPE 1A
CURB INLET
5'-0" OR 10'-0" OPENING

CITY ENGINEER
GARY JANZEN, P.E.

PROJECT NUMBER	OCA NUMBER	DATE
		11/2010

CITY ENGINEER'S OFFICE
CITY HALL - SEVENTH FLOOR
455 NORTH MAIN STREET
WICHITA, KANSAS 67202-1620
(316) 268-4501

SHEET

SW-103

PEI NO. 120730

Consultant Information:
PEI PLANNING ENGINEERING IMPLEMENTATION
PHELPS ENGINEERING, INC.
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Olathe, Kansas 66061
(913) 393-1155
Fax (913) 393-1156
www.phelpsengineering.com

Licensee: Jeffrey W. Laubach, P.E.
License Number: 18824
Licensed As: Professional Engineer

JEFFREY WAYNE LAUBACH LICENSED 18824 5/22/13 KANSAS PROFESSIONAL ENGINEER

Project: Wichita, Kansas '02' Style Store
Location: NE Corner of S. Meridian Ave. & I-235 Wichita, Kansas
CASEY'S CONSTRUCTION DIVISION
One Convenience Blvd, Ankeny, IA 50021
Phone: 515-965-6100

Publication Date: 05.22.13
With Revisions On:

PERMIT PLANS

Sheet Information: STORM SEWER DETAILS

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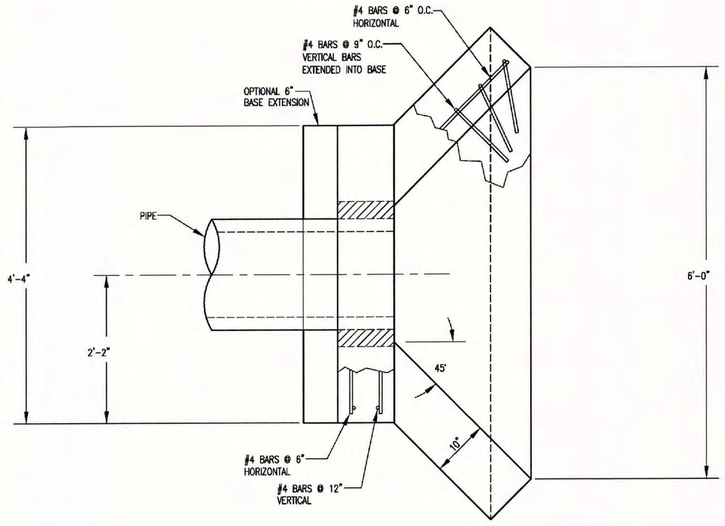
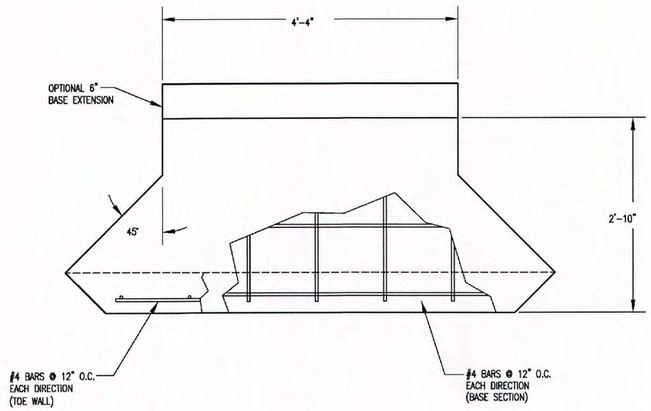
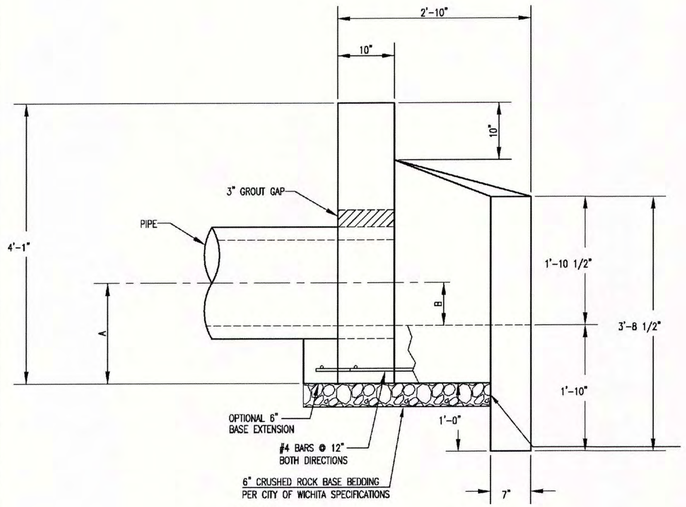


PLAN VIEW

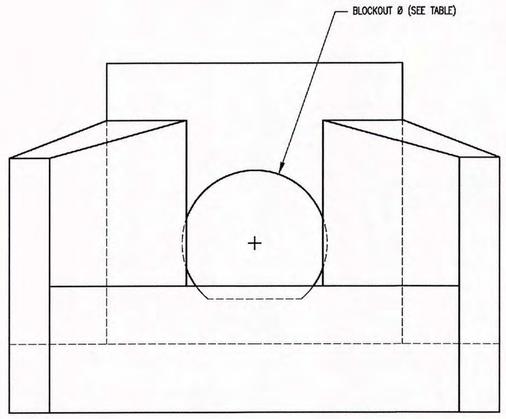


PLAN VIEW
BASE

PIPE Ø	A	B	BLOCKOUT Ø
15"	1'-5 1/2"	7 1/2"	2'-1 1/2"
18"	1'-7"	9"	2'-5"
24'	1'-10"	1'-0"	3'-0"



ELEVATION



FRONT VIEW

HEADWALLS, AS SHOWN, WILL NOT SUPPORT FLAP GATE.

CITY OF WICHITA
PUBLIC WORKS & UTILITIES
ENGINEERING DIVISION

HEADWALL DETAILS FOR 15", 18", AND 24" PIPE

CITY ENGINEER
GARY JANZEN, P.E.

PROJECT NUMBER	OCA NUMBER	DATE
		11/2010

CITY ENGINEER'S OFFICE
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SHEET

SW-402

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Project:
Wichita, Kansas
'O2' Style Store

Location:
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Wichita, Kansas

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STORM SEWER DETAILS

D5

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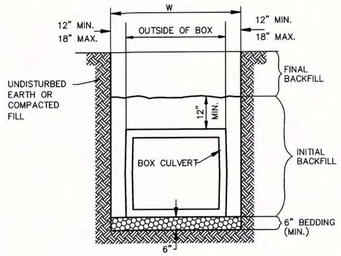
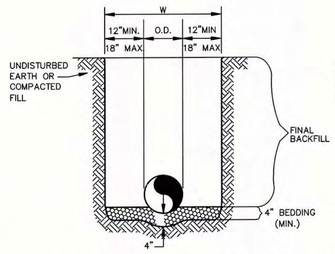


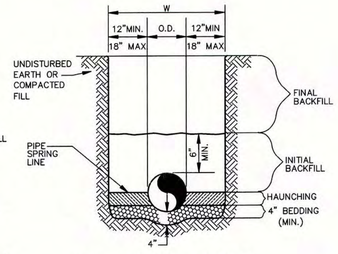
CONCRETE BOX CULVERT

N.T.S.



REINFORCED CONCRETE PIPE (RCP) AND SPIRAL RIB PIPE SMALLER THAN 60"ø

N.T.S.



ALL OTHER PIPES INCLUDING SPIRAL RIB PIPE 60"ø AND LARGER

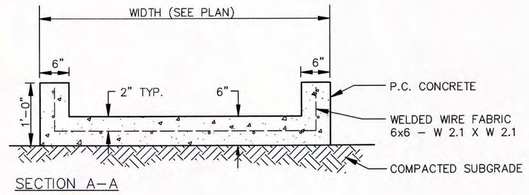
N.T.S.

GENERAL NOTES

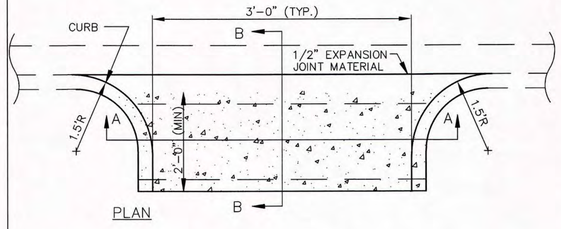
1. BEDDING SHALL BE CLASS I–A WORKED BY HAND. IF GROUNDWATER IS ANTICIPATED, THEN BEDDING SHALL BE CLASS I–B COMPACTED TO 85% STANDARD PROCTOR.
2. HAUNCHING SHALL BE WORKED AROUND THE PIPE BY HAND TO ELIMINATE VOIDS AND SHALL BE CLASS I–A OR CLASS I–B OR CLASS II COMPACTED TO 85% PROCTOR.
3. INITIAL BACKFILL SHALL BE CLASS I–A WORKED BY HAND, OR CLASS I–B OR CLASS II COMPACTED TO 85% STANDARD PROCTOR.
4. INITIAL BACKFILL NOT UNDER PAVED AREAS CAN BE CLASS III COMPACTED TO 90% STANDARD PROCTOR.
5. FINAL BACKFILL SHALL BE CLASS I, II, OR III COMPACTED AS NOTED IN NOTES 3. AND 4.
6. FINAL BACKFILL NOT UNDER PAVED AREAS CAN BE CLASS IV–A COMPACTED TO 95% STANDARD PROCTOR.
7. ALL MATERIALS ARE CLASSIFIED IN ACCORDANCE WITH ASTM D 2321–LATEST EDITION.
8. ALL MATERIALS SHALL BE INSTALLED IN MAXIMUM 8" LOOSE LIFTS IN ACCORDANCE WITH ASTM D 698. CLASS III AND IV–A MATERIALS SHALL BE COMPACTED NEAR OPTIMUM MOISTURE CONTENT.
9. FILL SALVAGED FROM EXCAVATION SHALL BE FREE OF DEBRIS, ORGANICS AND ROCKS LARGER THAN 3".
10. ALL TRENCH EXCAVATIONS SHALL BE SLOPED, SHORED, SHEETED, BRACED, OR OTHERWISE SUPPORTED IN COMPLIANCE WITH OSHA REGULATIONS AND LOCAL ORDINANCES. (SEE SPECIFICATIONS)

STORM SEWER
TRENCH AND BEDDING

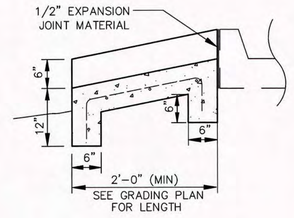
STORM SEWER TRENCH AND BEDDING DETAIL



SECTION A–A



PLAN



SECTION B–B

CONCRETE FLUME DETAIL

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STANDARD DETAILS

D6

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