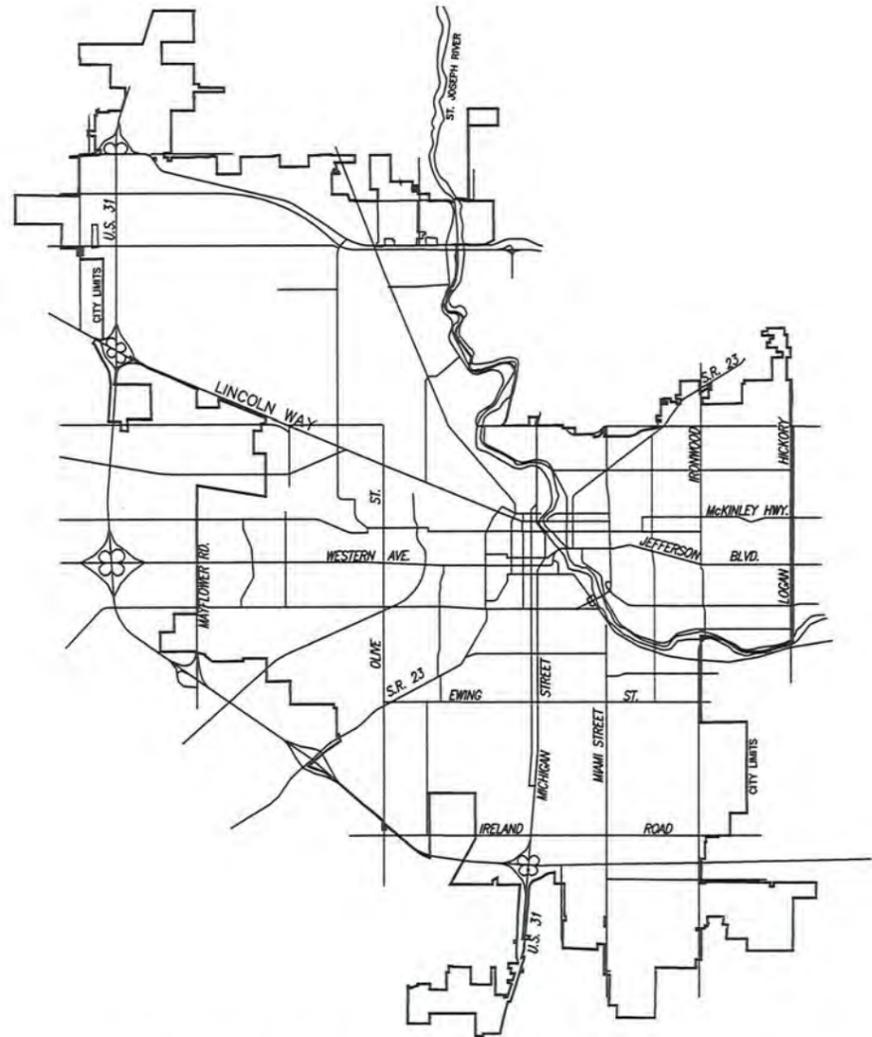


CITY OF SOUTH BEND, INDIANA

DEPARTMENT OF PUBLIC WORKS



DATE	REVISION	PAGE
1/14/2011	REVISED CITY LIMITS	COVER
8/11/2015	REVISED BOARD MEMBERS	COVER

APPROVED BY
BOARD OF PUBLIC WORKS

DATE 8-11-2015

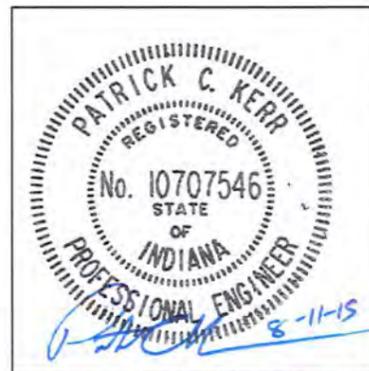
Gary A. Gilot
GARY A. GILOT PRESIDENT

David F. Rejos
David F. RELOS MEMBER

Brian J. Pawlowski
BRIAN J. PAWLOWSKI MEMBER

Elizabeth A. Maradik
ELIZABETH A. MARADIK MEMBER

James A. Mueller
JAMES A. MUELLER MEMBER



I HEREBY CERTIFY THAT THESE STANDARDS WERE PREPARED UNDER MY DIRECT SUPERVISION

RECOMMENDED FOR
APPROVAL

DATE 8-11-15 UNKNOWN

Patrick C. Kerr
PATRICK C. KERR, PH.D., P.E. CITY ENGINEER

Toy Villa
TOY VILLA 8.14.15
MANAGER, BUREAU OF PUBLIC CONSTRUCTION

DESIGN & CONSTRUCTION STANDARDS

NO.	DESCRIPTION	NO.	DESCRIPTION	NO.	DESCRIPTION	NO.	DESCRIPTION
	ADMINISTRATION		STREETS		WASTEWATER		WATER
AA	INDEX	SC-1	CONCRETE CURB	WW-1	MANHOLES	W-1	PIPE LAYING
A-1	DRAWING & SPECIFICATION REQUIREMENTS			*	MANHOLES	W-2	CROSS OVER
A-2	TYPICAL TITLE SHEET			WW-2	SEWER TAPPING	W-3	VALVE AND FITTINGS
A-3	TYPICAL AS-BUILT SHEET			WW-3	VERTICAL & SLANT STACKS	W-4	RESTRAIN METHODS
		SG-1	MINOR STREET SECTION	WW-4	ENCASED PIPE	W-5	TEES, RESTRAINS, & BLOCKING
		SG-2	COLLECTOR STREET SECTION	WW-5	TYPICAL CLEAN-OUT	W-6	ELBOWS, RESTRAINS, & BLOCKING
	DRAINAGE			WW-6	PIPE BEDDING DETAIL	W-7	DEAD END MAINS RESTRAINS AND BLOCKING
D-1	RAINFALL CHART AND COEFFICIENT "C" TABLE			WW-7	PIPE	W-8	RESTRAINING DESIGN CRITERIA
D-2	TIME OF CONCENTRATION AND DESIGN DATA	SP-1	FLEXIBLE PAVEMENT DESIGN CHART	WW-8	PIPE	W-9	FIRE HYDRANT ASSEMBLY
D-3	DRYWELL AND INLET	SP-2	MINIMUM THICKNESS CHART			W-10	FIRE HYDRANT ASSEMBLY
*	CASTINGS	SP-3	JOINT LOCATION- CONCRETE PAVEMENT				
*	INLETS	SP-4	JOINTS- CONCRETE PAVEMENT				TRAFFIC
*	CATCH BASINS	SP-4A	JOINT LOCATION- CONCRETE PAVEMENT			*	STANDARD DETOUR SIGNS - 1, 1A, 1B, 1C, 1D, 2, 2A, 3, 3A, 4, 5
*	HEADWALLS, ANCHORS, ETC.	SP-5	BRICK PAVER REPLACEMENT			*	SIGN DESIGN DETAILS - 5A
*	END SECTIONS					*	FOUNDATIONS - mT, mT6c, mT6d, mT7
						*	TRAFFIC PROJECT CONSTRUCTION SIGNAGE - mT9i
	EROSION & SEDIMENT CONTROL	SR-1	UTILITY PAVEMENT CUT			T-1	HANDHOLE
ES-1	CONSTRUCTION BMP'S						
ES-2	CONSTRUCTION BMP'S	SW-1	RESIDENTIAL - SIDEWALK AND APPROACH				
ES-3	CONSTRUCTION BMP'S	SW-2	COMMERCIAL AND INDUSTRIAL SIDEWALK AND APPROACH				
ES-4	CONSTRUCTION BMP'S						
ES-5	POST CONSTRUCTION BMP'S	*	HANDICAP RAMPS				
ES-6	POST CONSTRUCTION BMP'S						
ES-7	POST CONSTRUCTION BMP'S						

6	RSG	4/04/07	NEW SHEET T-1	
7	RSG	9/30/09	REVISED DESCRIPTIONS	
No.	BY	DATE	REVISION	DATE 7-11-90
1	DRW	12/8/92		DRAWN E.J.L.
2	DM	5/8/00		CHECKED T.V.
3	JRP	11/19/01	NEW BORDER & UNIFORM TEXT	APRVD C.P.L.
4	RSG	2/13/07	NEW SHEET A-3	SCALE
5	RSG	3/23/07	NEW SHEET SP-5	NONE



* REFER TO INDIANA DEPARTMENT OF HIGHWAYS ROAD & TRAFFIC STANDARDS

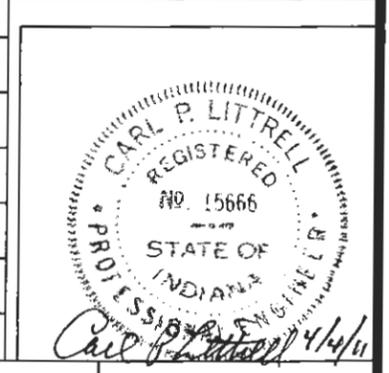
DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION	
<input checked="" type="checkbox"/>	CIVIL
<input type="checkbox"/>	TRAFFIC
<input type="checkbox"/>	WATER
<input type="checkbox"/>	WASTE WATER
<input type="checkbox"/>	

INDEX

STANDARD DRAWING

SHEET NO.
AA



CHECK LIST - DRAWINGS

CHECK LIST - SPECIFICATIONS

SEQUENCE	SHEET	ITEMS REQUIRED	S/P	SEQUENCE	SHEET	ITEMS REQUIRED	S/P	SEQUENCE	SHEET	ITEMS REQUIRED	S/P		
FIRST	TITLE	KEY MAP	X X	THIRD (CON'T.)	PLAN & PROFILE (STREETS & ROADS)	RADI AT PROP. INTERSECTION	X X	FIRST	TITLE	PROJECT NAME & NUMBER	X X		
		PROJECT NAME	X X			OWNER'S & BOARD'S NAME	X X						
		LOCATION	X X			APC APPROVAL DATE	X X						
		STREETS (UTILITIES) INCLUDED	X X			EXISTING UTILITIES - ABOVE & BELOW GROUND	X X						
		BOARD NAME	X X			NAMES OF PROPERTY OWNERS	X						
		A.P.C. APPROVAL DATE	X X			TITLE BLOCK COMPLETION-PROJECT; STREET(S) NAME; SECTION NO.; GRAPHIC & NUMERIC SCALE; DATE	X X						
		DIRECTOR P.W. APPROVAL	X X			SPECIAL DITCHES VERTICAL & HORIZONTAL SURVEY DATA	X X						
		OWNER'S NAME & ADDRESS	X			LIMITS OF EACH DITCH SECTION	X X						
		CONS. ENGR'S. NAME & SEAL	X X			LIMITS & TYPE - EROSION CONT.	X X						
		STANDARD DRAWINGS LISTED	X X										
		SECOND	DETAILS			APPR'V'L PREL. PLAT FOR CONTRACT	X			FOURTH	PLAN & PROFILE (SEWERS & WATER)	DRAWN ON INTERMEDIATE COPY OF STREET P & P	X
APPR'V'L PREL. OR FINAL PLAT OF PRIOR ADJ. AREA (IF AVAIL.)	X			HORIZONTAL SURVEY DATA	X X	REV. SET - MINUS BIDDING	X						
TENT. PLAT OF PROP. ADJ. AREA (IF AVAILABLE)	X			VERTICAL SURVEY DATA	X X								
SPCL. DET'L'S-THIS CONT-TYP. SECT. ROAD-DITCH-BRIDGE; SPCL. APPURTENANCES, INTERSECTION, DRIVES, SODDING, EROSION CONTROL, ETC.	X X			PROP. MANHOLES, INLETS, ETC.	X X	THIRD	SPECIAL PROVISIONS	LIMIT OF CONTRACT	X X				
EXIST. SITE PLAN-BRIDGE	X			PROP. VALVES, HYDRANTS, ETC.	X X			CITY SPECIAL REFERENCE	X X				
PROP. SITE PLAN-BRIDGE	X			PROP. HOUSE SEWER SERVICES	X X			NO. OF SHEETS IN DRAWING	X X				
SPCL. BRIDGE DETAILS	X			PROP. HOUSE WATER SERVICES	X X			DETAILED SPECIAL PROVISIONS CORRELATED TO EACH ITEM OF WORK	X X				
SOIL LOG WITH GRADATION CHART & ENGR'S ANALYSIS OF SUITABILITY OF USE	X X			NOTES, DETAILS & STANDARDS CROSS REFERENCED	X X			COMPLETION DATE	X				
								UNIT PRICE PROPOSAL	X				
THIRD	PLAN & PROFILE (STREETS & ROADS)	NORTH ARROW	X X	FIFTH	CROSS SECTIONS			ROADS - INTERVAL PER INSTRUCTION	X	<p>NOTE: IT IS REQUIRED THAT EACH LAND DEVELOPER ISSUE FULL SET OF DRAWINGS & SPECIFICATIONS TO EACH CONTRACTOR.</p> <p>GENERAL NOTES:</p> <p>1. - SEQUENCE: ORDER OF SHEETS. S = SUBDIVISION REQUIREMENTS. P = PUBLIC WORKS REQUIREMENTS</p> <p>2. - DRAWINGS- 24" X 36" STANDARD SHEETS P. & P. REQUIRED PLATE I FED. AID X- SECTION REQUIRED PLATE I FED. AID</p> <p>3. - DESIGN DATA CRITERIA - SEE OTHER STANDARDS.</p> <p>4. - "AS BUILT" DRAWINGS ARE TO BE FILED WITH COMPLETION AFFIDAVIT, SUBMITTED AS REPRODUCIBLE COPIES OR ON DISK IN DXF OR DWG FORMAT SHOWING: CONTRACTORS, UTILITIES AND DATE OF COMPLETION.</p>			
		STATION - TO NORTH & EAST	X X			SPECIAL DITCHES							
		POINTS OF BEGINNING & ENDING	X X			1.- INTERVAL- 50' PLUS CHANGES IN ALIGNMENT OR SECTION	X						
		BENCH MARKS - USGS DATUM - 1 PER 1000', MIN. 2 PER CONTRACT	X X			2. INTERVAL- PER INSTRUCTION	X						
		HORIZ. SURVEY DATA	X X			RETENTION AREAS EITHER 50' INTERVALS OR 2' CONTOUR MAP	X X						
		VERTICAL SURVEY DATA	X X			TEMPLATE PLOTTING	X						
		EXISTING RIGHT OF WAY	X X			AREAS & VOLUMES	X						
		PROP. RIGHT OF WAY	X										
		PROPERTY LINES & LOT NO.'S	X X										
		EQUATIONS AT INTERSECTIONS & CROSSING SURVEY LINES	X X										
		CONTROL POINTS REFERENCED	X										
		PROP. PAVEMENT - SHADED	X X										
AS REQUIRED - P	AS REQUIRED - P	EXISTING ROAD-DASHED; ALSO STREETS IN PRIOR SECTION	X X	SIXTH	STANDARDS	APPLICABLE STANDARDS INCLUDED IN CONTRACT	X X						

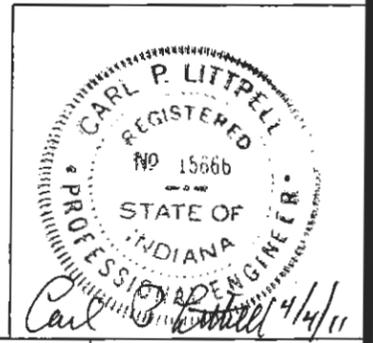
No.	BY	DATE	REVISION	DATE	7-12-90
1	D.M.	5/8/00		DRAWN	EJL
2	JRP	11/28/01	REVISED BORDER & TEXT SIZE	CHECKED	TV
				APRVD	CPL
					SCALE
					NONE



DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION
<input checked="" type="checkbox"/> CIVIL
<input type="checkbox"/> TRAFFIC
<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER

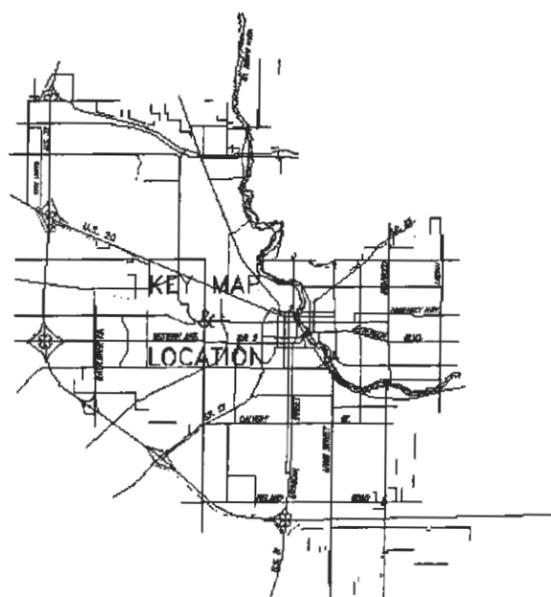
DRAWING AND
SPECIFICATION REQUIREMENTS



STANDARD
DRAWING
SHEET NO.
A-1

CITY OF SOUTH BEND, INDIANA DEPARTMENT OF PUBLIC WORKS

PROJECT SEWER WATER TRAFFIC STREET OTHER

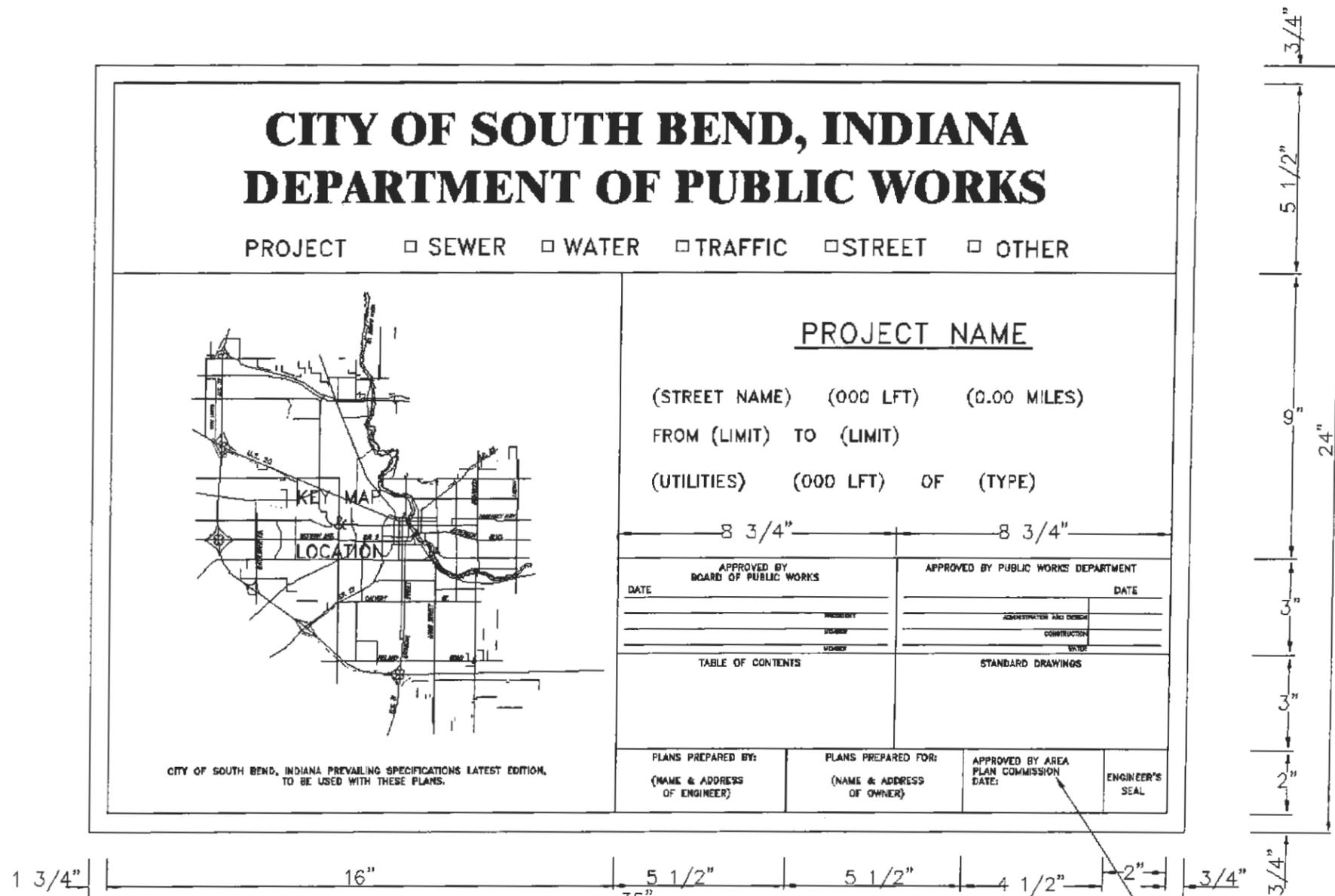


CITY OF SOUTH BEND, INDIANA PREVAILING SPECIFICATIONS LATEST EDITION,
TO BE USED WITH THESE PLANS.

PROJECT NAME

(STREET NAME) (000 LFT) (0.00 MILES)
FROM (LIMIT) TO (LIMIT)
(UTILITIES) (000 LFT) OF (TYPE)

APPROVED BY BOARD OF PUBLIC WORKS		APPROVED BY PUBLIC WORKS DEPARTMENT	
DATE		DATE	
RESIDENT		ADMINISTRATOR AND DESIGN	
OWNER		CONSTRUCTION	
OWNER		OWNER	
TABLE OF CONTENTS		STANDARD DRAWINGS	
PLANS PREPARED BY: (NAME & ADDRESS OF ENGINEER)	PLANS PREPARED FOR: (NAME & ADDRESS OF OWNER)	APPROVED BY AREA PLAN COMMISSION DATE:	ENGINEER'S SEAL



NOTES:

- 1.) THIS SHEET TO BE USED WITH EACH SET OF DRAWINGS.
- 2.) DIMENSIONS SHOWN FOR LETTERING INCLUDES VERTICAL SPACING AND DOES NOT INDICATE SIZE OF LETTERING.



No.	BY	DATE	REVISION	DATE	2-5-93
1	D.M.	5/8/00		DRAWN	DRW
2	JRP	11/28/01	REVISED BORDER & TEXT SIZE	CHECKED	TV
				APRVD	CPL
					SCALE
					NONE



DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

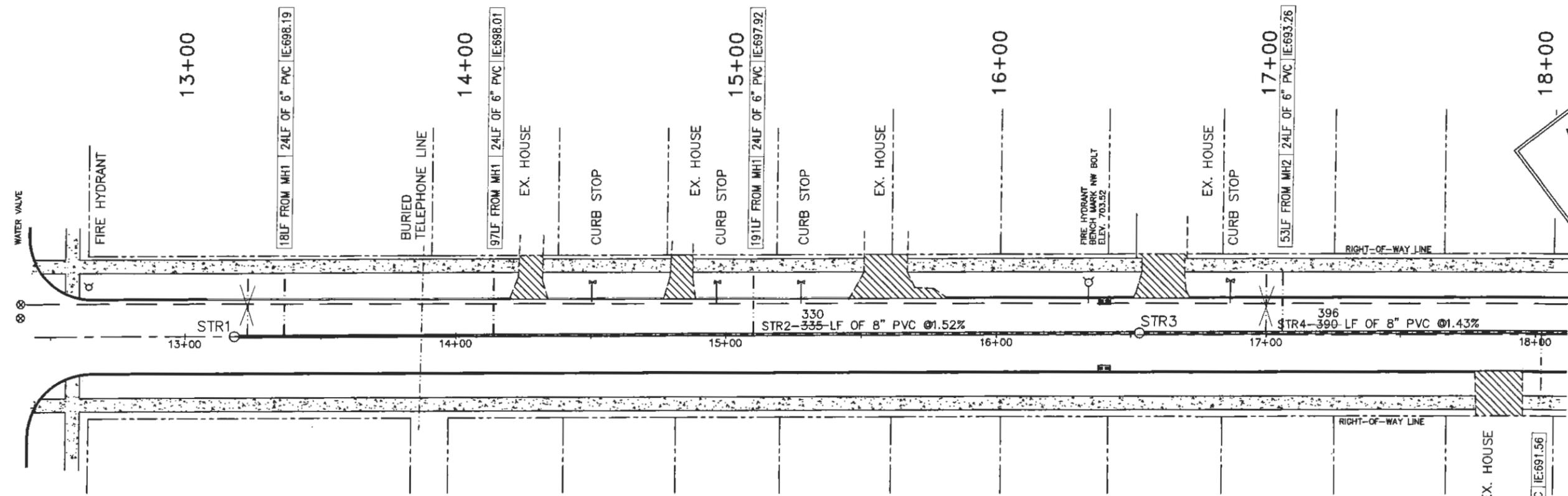
DIVISION
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<input type="checkbox"/> TRAFFIC
<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER

TYPICAL TITLE SHEET

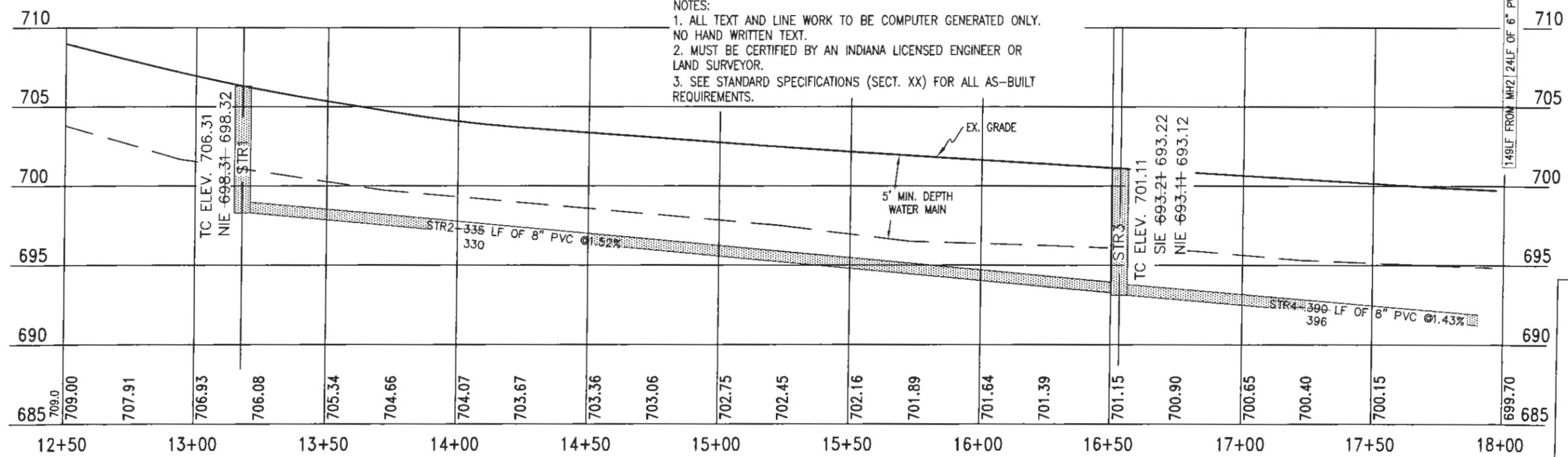
STANDARD
DRAWING

SHEET NO.
A-2

AS-BUILT
 DATE: XX/XX/XXXX
 PROVIDED BY: CONTRACTOR NAME



NOTES:
 1. ALL TEXT AND LINE WORK TO BE COMPUTER GENERATED ONLY. NO HAND WRITTEN TEXT.
 2. MUST BE CERTIFIED BY AN INDIANA LICENSED ENGINEER OR LAND SURVEYOR.
 3. SEE STANDARD SPECIFICATIONS (SECT. XX) FOR ALL AS-BUILT REQUIREMENTS.



No.	BY	DATE	REVISION	DATE
		1/18/2011		



DEPARTMENT OF PUBLIC WORKS
 CITY OF SOUTH BEND, INDIANA

DIVISION	
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<input type="checkbox"/>	TRAFFIC
<input type="checkbox"/>	WATER
<input type="checkbox"/>	WASTE WATER

TYPICAL AS-BUILT

STANDARD DRAWING
 SHEET NO.
 A-3

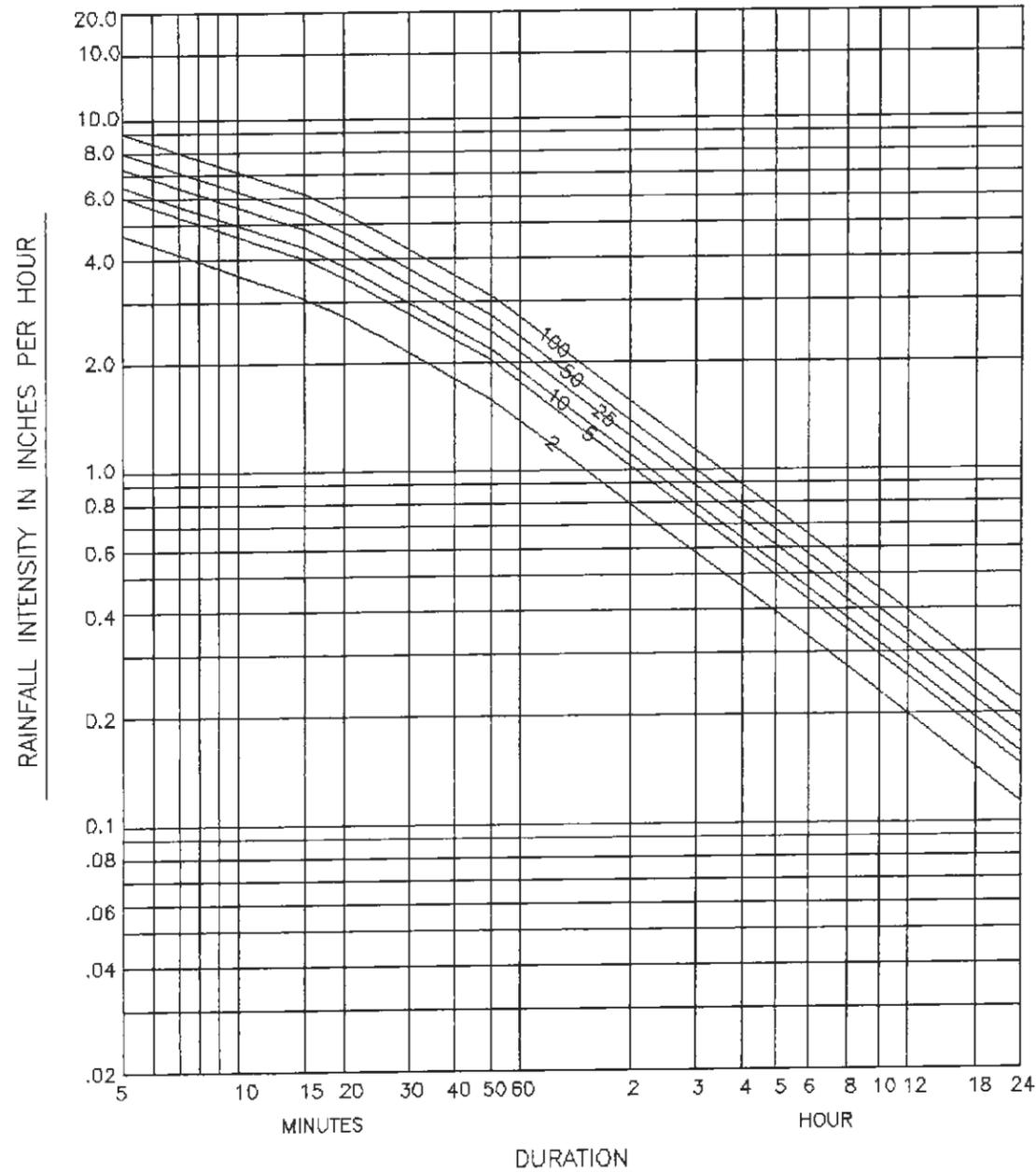
Rational Method Runoff C-Coefficients

Categorized by Surface

forest	0.059 - 0.2
asphalt	0.7 - 0.95
brick	0.7 - 0.85
concrete	0.8 - 0.95
shingle roof	0.75 - 0.95
lawns, well drained (sandy soil)	
up to 2% slope	0.05 - 0.1
2% to 7% slope	0.1 - 0.15
over 7% slope	0.15 - 0.2
lawns, poor drainage (clay soil)	
up to 2% slope	0.13 - 0.17
2% to 7% slope	0.18 - 0.22
over 7% slope	0.25 - 0.35

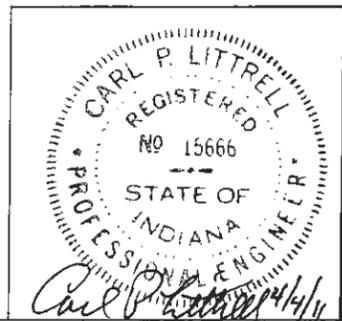
Categorized by Use

farmland	0.05 - 0.3
pasture	0.05 - 0.3
unimproved	0.1 - 0.3
parks	0.1 - 0.25
cemeteries	0.1 - 0.25
railroad yards	0.2 - 0.35
playgrounds (except asphalt or concrete)	0.2 - 0.35
business districts	
neighborhood	0.5 - 0.7
city (downtown)	0.7 - 0.95
residential	
single family	0.3 - 0.5
multiplexes, detached	0.4 - 0.6
multiplexes, attached	0.6 - 0.75
suburban	0.25 - 0.4
apartments, condominiums	0.5 - 0.7
industrial	
light	0.5 - 0.8
heavy	0.6 - 0.9



NOTE:

DERIVED FROM ISOPLUVIAL MAPS
 TECHNICAL PAPER NO. 40,
 RAINFALL FREQUENCY ATLAS OF THE UNITED STATES,
 PUBLISHED BY U.S. DEPARTMENT OF COMMERCE.



No.	BY	DATE	REVISION	DATE	7-10-89
1	DM	5/8/00		DRAWN	EJL
2	HK	3/22/01		CHECKED	TV
3	JRP	12/13/01	REVISED BORDER & TEXT SIZE ADD C-COEFFICIENTS	APRVD	CPL
				SCALE	NONE



DEPARTMENT OF PUBLIC WORKS
 CITY OF SOUTH BEND, INDIANA

DIVISION	
<input checked="" type="checkbox"/>	CIVIL
<input type="checkbox"/>	TRAFFIC
<input type="checkbox"/>	WATER
<input type="checkbox"/>	WASTE WATER

RAINFALL CHART AND
 COEFFICIENT "C" TABLE

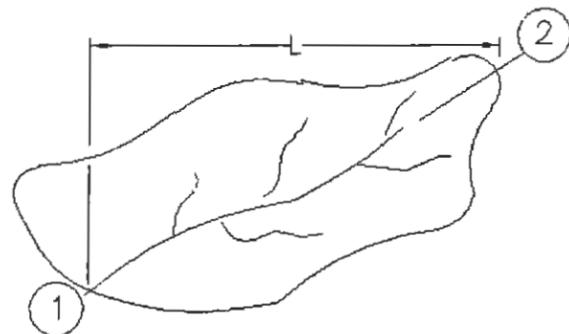
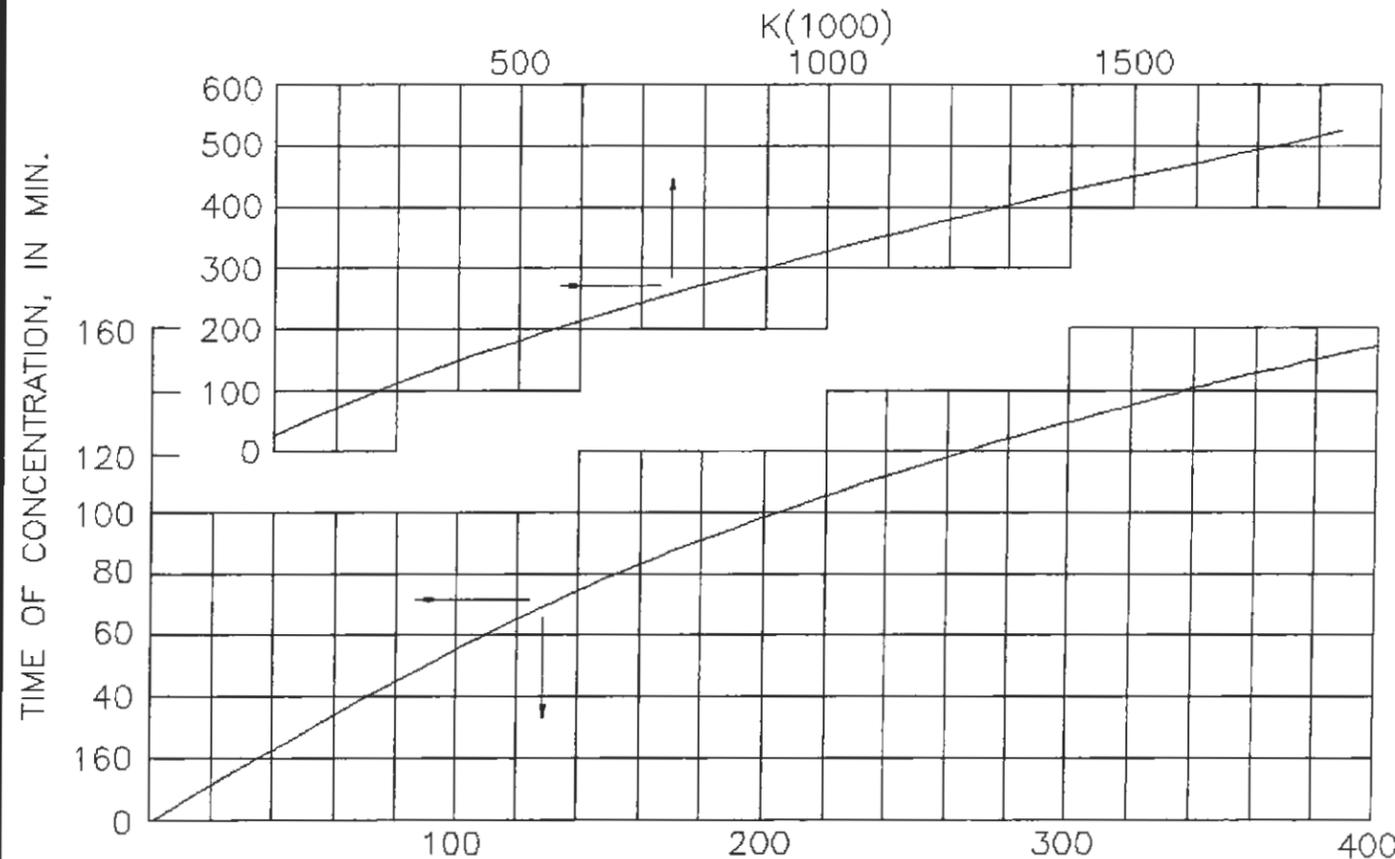
STANDARD
 DRAWING
 SHEET NO.
 D-1

DRAINAGE DESIGN CRITERIA

1. RATIONAL METHOD TO BE USED $Q=CIA$
 Q = DISCHARGE
 C = COEFFICIENT OF RUNOFF- STD. DRAWING D-1
 A = AREA OF WATERSHED- ACRES
2. RAINFALL INTENSITY CURVE; 10 YEAR UNLESS OTHERWISE SPECIFICALLY REQD. (MINIMUM 6 HOUR DURATION)
3. CULVERT DESIGN "CAPACITY CHARTS FOR THE HYDRAULIC DESIGN OF HIGHWAY CULVERTS" HYDRAULIC ENGINEERING CIRCULAR NO. 10 U.S. DEPARTMENT OF COMMERCE
4. OPEN CHANNEL DESIGN:
 1. "DESIGN CHARTS FOR OPEN CHANNEL FLOW"- HYDRAULIC DESIGN SERIES NO.3- U.S. DEPARTMENT OF COMMERCE (CAN ALSO BE USED FOR STORM SEWERS WITHIN LIMITS OF CHARTS)
 2. "DESIGN OF ROADSIDE DRAINAGE CHANNELS"- HYDRAULIC DESIGN SERIES NO.4- U.S. DEPARTMENT OF COMMERCE
5. BRIDGE HYDRAULIC:
 1. TENTATIVE: "HYDRAULICS OF BRIDGE WATERWAY"- HYDRAULIC DESIGN SERIES NO.1-U.S. DEPARTMENT OF COMMERCE.
 2. MUST BE PER INDIANA FLOOD CONTROL REQUIREMENTS AT ALL TIMES FOR DESIGNATED STREAMS.
6. RETENTION AREAS:
BY SPECIAL DESIGN

NOTE:

1. CHART TO BE USED ONLY FOR OVERLAND FLOW IN WATERSHED.
2. ENGINEER/DESIGNER TO COMPUTE TIME OF CONCENTRATION ACCORDING TO ACCEPTED METHODS FOR IMPROVED AREAS AND STORM SEWERS.

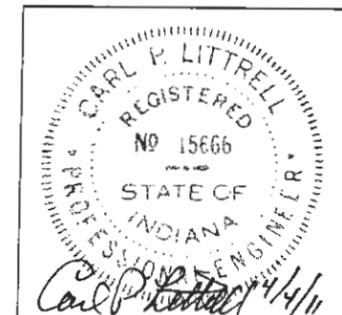


$$K = \frac{L}{\sqrt{S}}$$

L = LENGTH OF MOST DISTANT CONTRIBUTING POINT
 H = DIFFERENCE IN ELEVATION BETWEEN POINT 1 AND POINT 2
 S = SLOPE = H/L

WATERSHED CHARACTERISTICS

TIME OF CONCENTRATION AS A FUNCTION OF WATERSHED LENGTH AND SLOPE.
 FROM "P.C.A." ENGINEERING DESIGN OF CULVERTS



No.	BY	DATE	REVISION	DATE	7-10-89
1	DM	5/8/00		DRAWN	EJL
2	HK	3/22/01		CHECKED	TV
3	JRP	12/13/01	REVISED BORDER & TEXT SIZE	APRVD	CPL
				SCALE	NONE

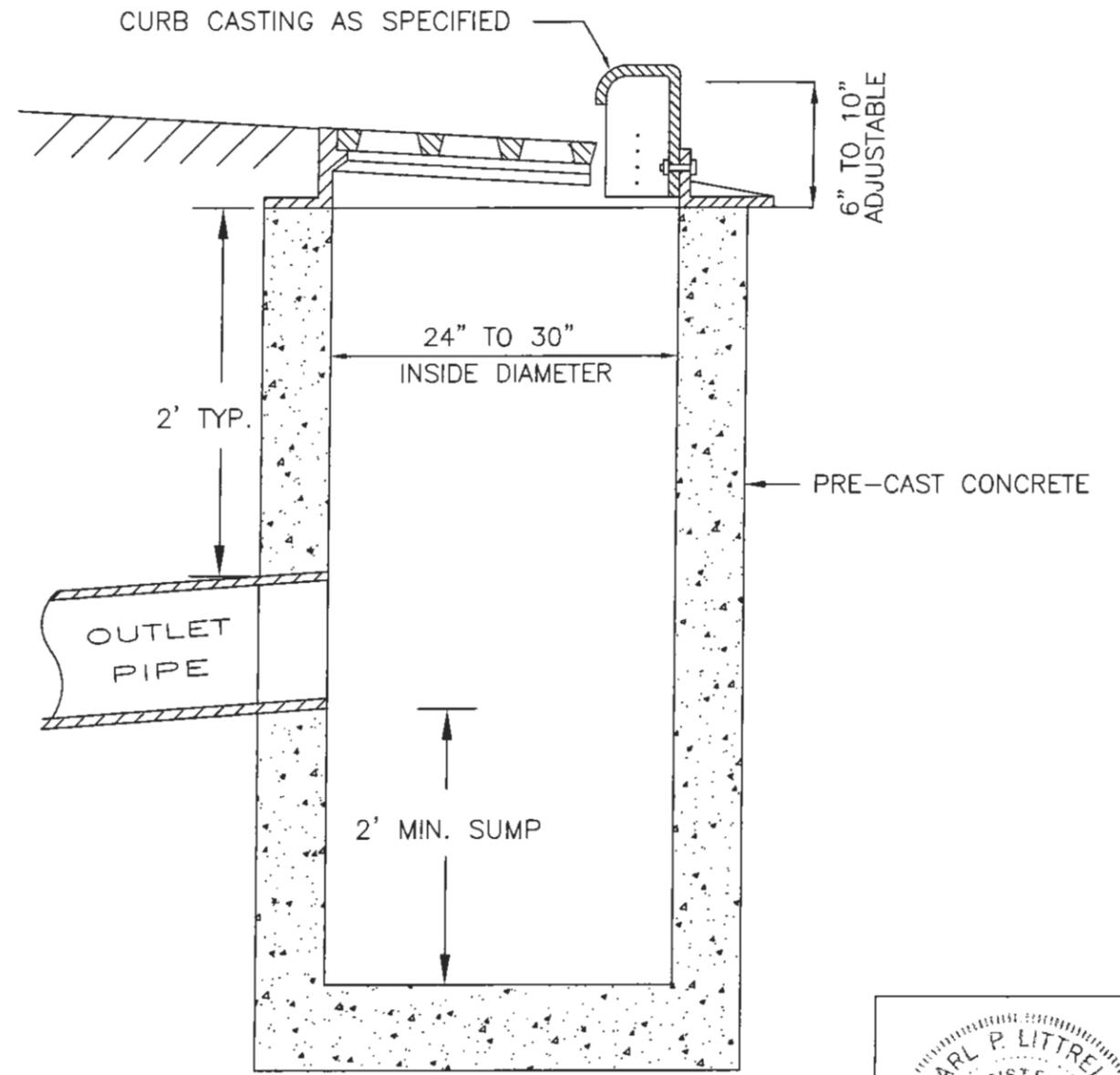
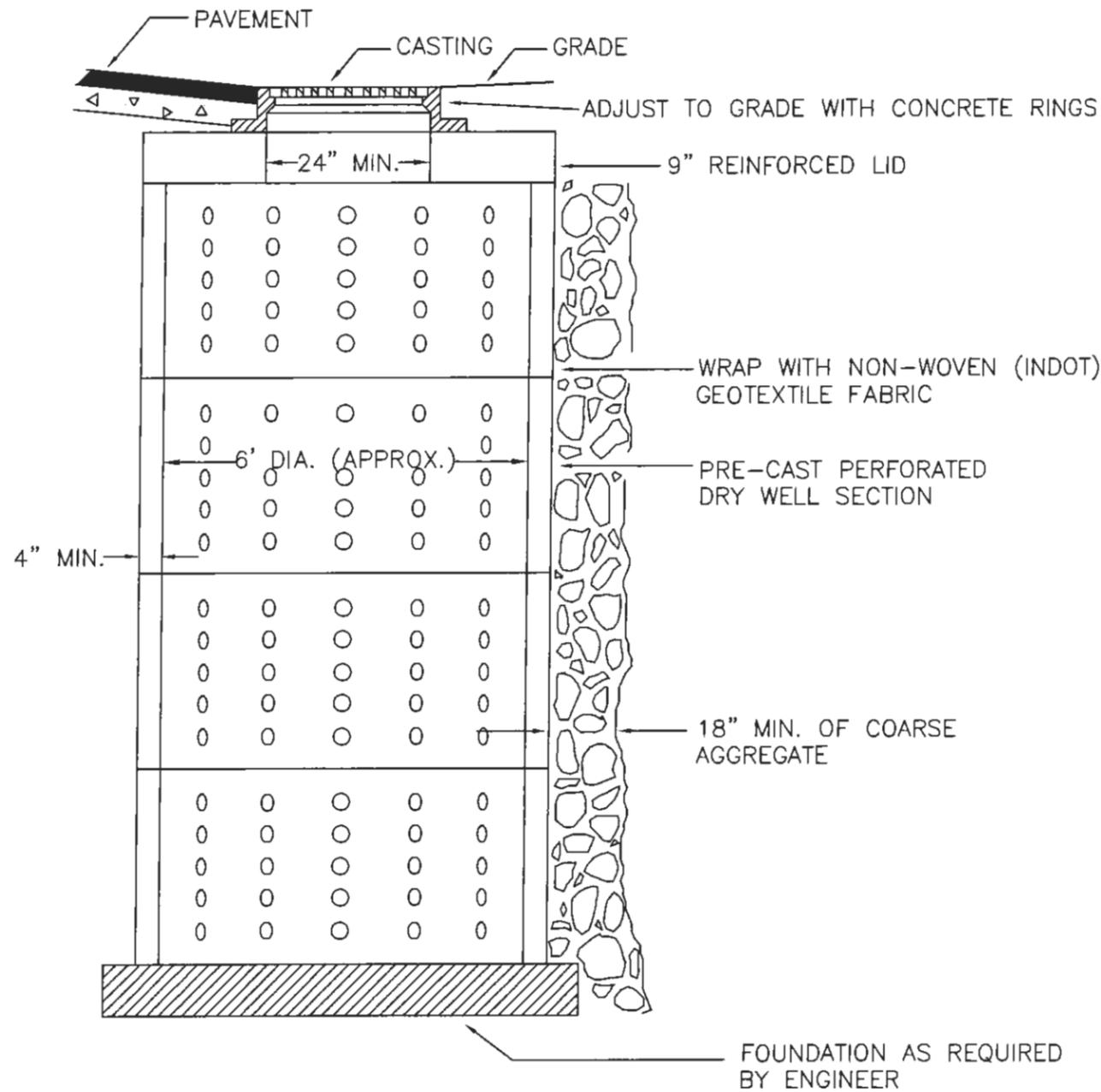


DEPARTMENT OF PUBLIC WORKS
 CITY OF SOUTH BEND, INDIANA

DIVISION	
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<input type="checkbox"/>	WASTE WATER

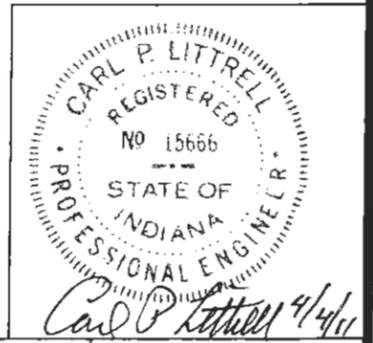
TIME OF CONCENTRATION
 AND DESIGN CRITERIA

STANDARD DRAWING
 SHEET NO.
 D-2



STANDARD PRE-CAST PERFORATED DRY WELL

STANDARD INLET



No.	BY	DATE	REVISION	DATE	7-10-89
1	DRW	3/93		DRAWN	EJL
2	D.M.	5/26/98		CHECKED	TV
3	H.K.	3/22/01		APRVD	CPL
4	JRP	11/28/01	REVISED BORDER & TEXT SIZE		SCALE
5	RSG	1/18/11	REVISED DETAILS		NONE

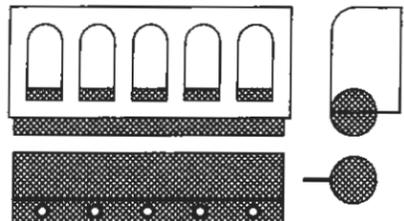
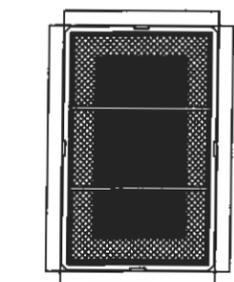


DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

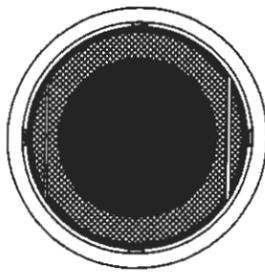
DIVISION	
<input checked="" type="checkbox"/>	CIVIL
<input type="checkbox"/>	TRAFFIC
<input type="checkbox"/>	WATER
<input type="checkbox"/>	WASTE WATER

PRE-CAST DRY WELL
AND INLET

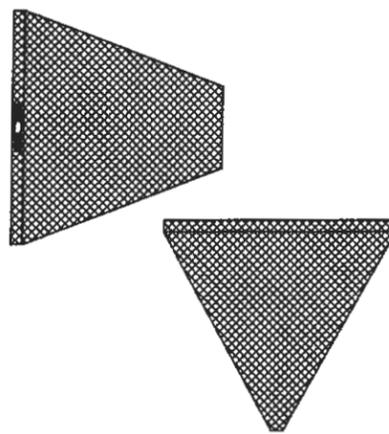
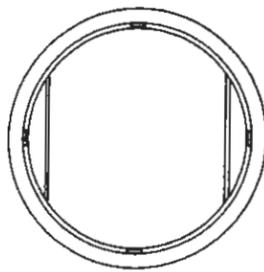
STANDARD DRAWING
SHEET NO. D-3



This detail depicts the typical placement of the HR (hydrocarbon removal) pillow. An HR pillow is hemmed to the entire perimeter of the sediment bag +/- 4" from the top of the bag and extends +/- 4" towards center. Curb boxes are protected with a separate pillow that is secured to either the curb box vanes or the top flange of the Catch-All frame.

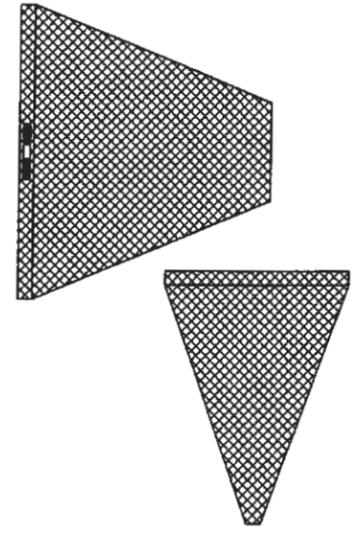


CATCH-ALL HR ABSORBENT PILLOW
PRE & POST CONSTRUCTION



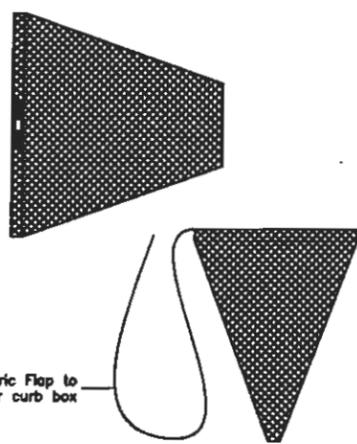
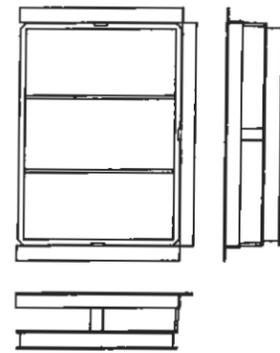
GENERAL NOTES:
FRAME: Top flange fabricated from 1 1/4"x1 1/4"x3/8" angle. Base rim fabricated from 1 1/2"x2 1/2"x3/8" channel. Handles and suspension brackets fabricated from 1 1/4"x3/4" flat stock. All steel conforming to ASTM-A36.
SEDIMENT BAG: Bag fabricated from 4 oz./sq.yd. non-woven polypropylene geotextile reinforced with polyester mesh. Bag secured to base rim with a stainless steel band and lock.

TYPICAL ROUND CATCH-ALL
PRE & POST CONSTRUCTION



GENERAL NOTES:
FRAME: Top flange fabricated from 1 1/4"x1 1/4"x3/8" angle. Base rim fabricated from 1 1/2"x2 1/2"x3/8" channel. Handles and suspension brackets fabricated from 1 1/4"x3/4" flat stock. All steel conforming to ASTM-A36.
SEDIMENT BAG: Bag fabricated from 4 oz./sq.yd. non-woven polypropylene geotextile reinforced with polyester mesh. Bag secured to base rim with a stainless steel band and lock.

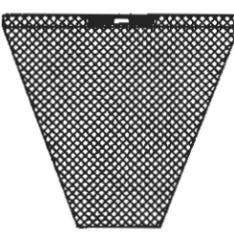
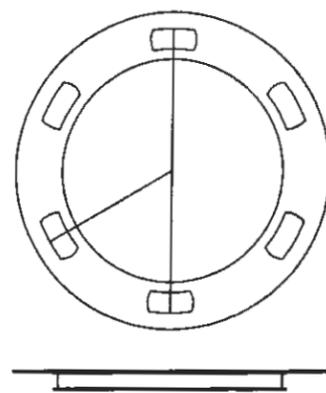
TYPICAL RECTANGULAR CATCH-ALL
PRE & POST CONSTRUCTION



Fabric Flap to cover curb box

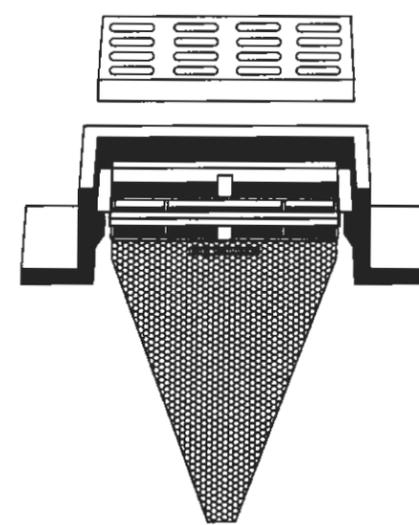
GENERAL NOTES:
FRAME: Top flange fabricated from 1 1/4"x1 1/4"x3/8" angle. Base rim fabricated from 1 1/2"x2 1/2"x3/8" channel. Handles and suspension brackets fabricated from 1 1/4"x3/4" flat stock. All steel conforming to ASTM-A36.
SEDIMENT BAG: Bag fabricated from 4 oz./sq.yd. non-woven polypropylene geotextile reinforced with polyester mesh. Bag secured to base rim with a stainless steel band and lock.

TYPICAL CURB BOX CATCH-ALL
PRE & POST CONSTRUCTION

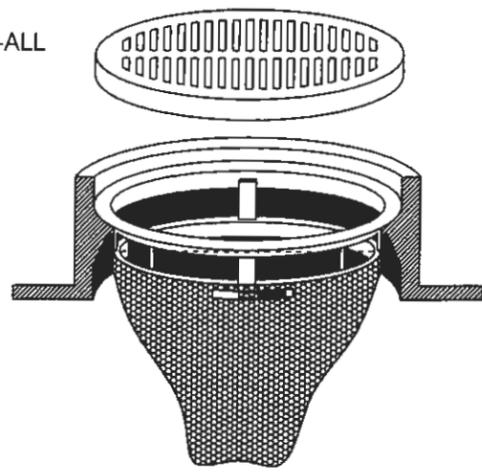


GENERAL NOTES:
FRAME: Top flange fabricated from 1 1/4"x1 1/4"x3/8" angle. Base rim fabricated from 1 1/2"x2 1/2"x3/8" channel. Handles and suspension brackets fabricated from 1 1/4"x3/4" flat stock. All steel conforming to ASTM-A36.
SEDIMENT BAG: Bag fabricated from 4 oz./sq.yd. non-woven polypropylene geotextile reinforced with polyester mesh. Bag secured to base rim with a stainless steel band and lock.

TYPICAL BEEHIVE CATCH-ALL
PRE & POST CONSTRUCTION

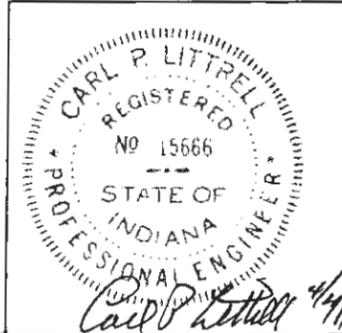


RECTANGULAR CASTING 3D CATCH-ALL
PRE & POST CONSTRUCTION



ROUND CASTING 3D CATCH-ALL
PRE & POST CONSTRUCTION

NOTES:
* OR APPROVED EQUAL



No.	BY	DATE	REVISION	DATE
		1/12/2010		
			DRAWN RSG	
			CHECKED RAN	
			APRVD C.P.L.	
			SCALE	
			NONE	

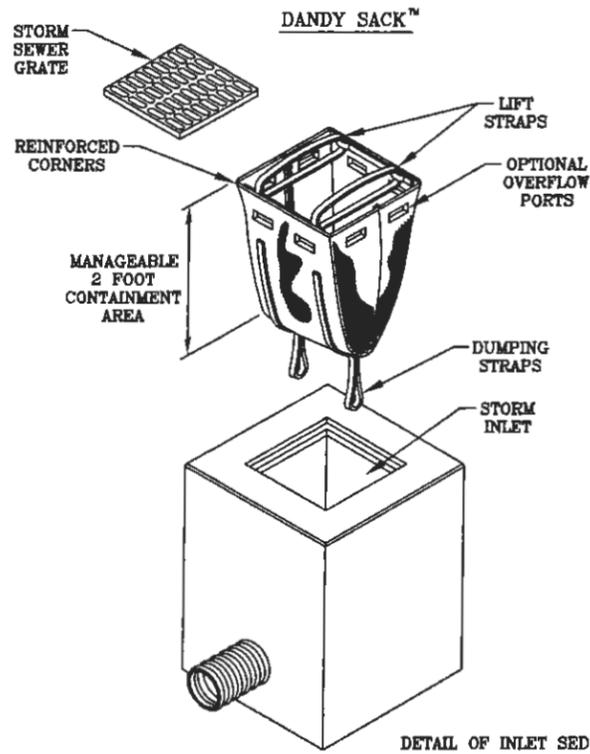


DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION	
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<input type="checkbox"/>	TRAFFIC
<input type="checkbox"/>	WATER
<input type="checkbox"/>	WASTE WATER

CONSTRUCTION BMP'S

STANDARD DRAWING
SHEET NO.
ES-1



NOTE: THE DANDY SACK™ WILL BE MANUFACTURED IN THE U.S.A. FROM A WOVEN MONOFILAMENT FABRIC THAT MEETS OR EXCEEDS THE FOLLOWING SPECIFICATIONS:

REGULAR FLOW DANDY SACK™ (BLACK)

Mechanical Properties	Test Method	Units	MARV
Grab Tensile Strength	ASTM D 4632	kN (lbs)	1.76 (400) x 1.40 (315)
Grab Tensile Elongation	ASTM D 4632	%	15 x 15
Puncture Strength	ASTM D 4833	kN (lbs)	0.67 (150)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	5506 (800)
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.67 (150) x 0.73 (165)
UV Resistance	ASTM D 4355	%	90
Apparent Opening Size	ASTM D 4751	Mm (US Std Sieve)	0.425 (40)
Flow Rate	ASTM D 4491	l/min/m ² (gal/min/ft ²)	2852 (70)
Permittivity	ASTM D 4491	Sec ⁻¹	0.90

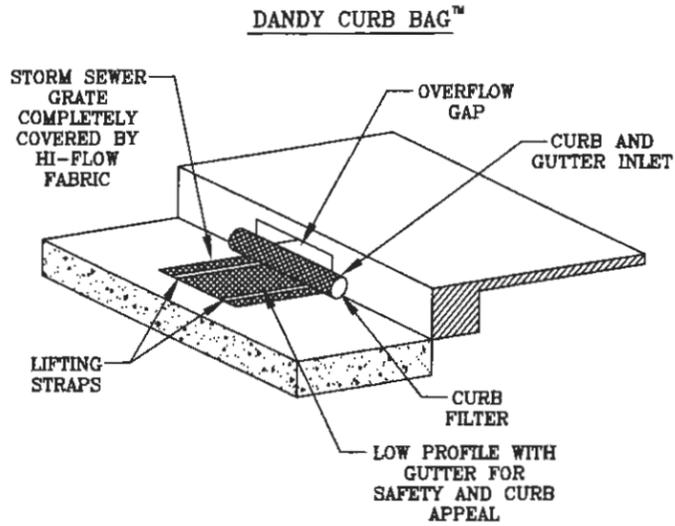
HI-FLOW DANDY SACK™ (SAFETY ORANGE)

Mechanical Properties	Test Method	Units	MARV
Grab Tensile Strength	ASTM D 4632	kN (lbs)	1.62 (365) x 0.89 (200)
Grab Tensile Elongation	ASTM D 4632	%	24 x 10
Puncture Strength	ASTM D 4833	kN (lbs)	0.40 (90)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	3097 (450)
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.51 (115) x 0.33 (75)
UV Resistance	ASTM D 4355	%	90
Apparent Opening Size	ASTM D 4751	Mm (US Std Sieve)	0.425 (40)
Flow Rate	ASTM D 4491	l/min/m ² (gal/min/ft ²)	5907 (145)
Permittivity	ASTM D 4491	Sec ⁻¹	2.1

*Note: All Dandy Sacks™ can be ordered with our optional oil absorbent pillows

DETAIL OF INLET SEDIMENT CONTROL DEVICE

DANDY SACK SPECIFICATION



NOTE: THE DANDY CURB BAG™ WILL BE MANUFACTURED IN THE U.S.A. FROM A WOVEN MONOFILAMENT FABRIC THAT MEETS OR EXCEEDS THE FOLLOWING SPECIFICATIONS:

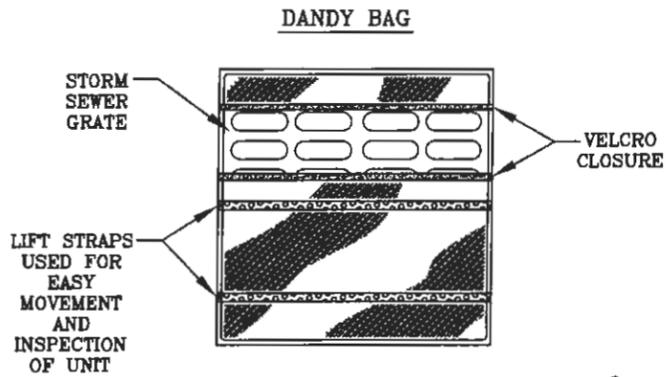
DANDY CURB BAG™ (SAFETY ORANGE)

Mechanical Properties	Test Method	Units	MARV
Grab Tensile Strength	ASTM D 4632	kN (lbs)	1.62 (365) x 0.89 (200)
Grab Tensile Elongation	ASTM D 4632	%	24 x 10
Puncture Strength	ASTM D 4833	kN (lbs)	0.40 (90)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	3097 (450)
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.51 (115) x 0.33 (75)
UV Resistance	ASTM D 4355	%	90
Apparent Opening Size	ASTM D 4751	Mm (US Std Sieve)	0.425 (40)
Flow Rate	ASTM D 4491	l/min/m ² (gal/min/ft ²)	5907 (145)
Permittivity	ASTM D 4491	Sec ⁻¹	2.1

*Note: All Dandy Curb Bags™ can be ordered with our optional oil absorbents

DETAIL OF CURB INLET SEDIMENT CONTROL DEVICE WITH CURB FILTER

DANDY CURB BAG SPECIFICATION

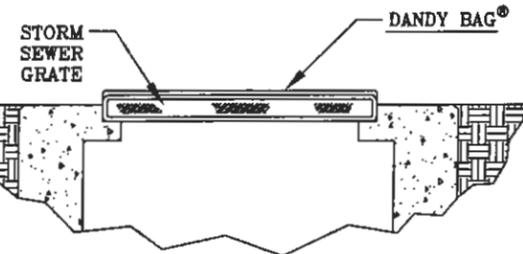


NOTE: THE DANDY BAG® WILL BE MANUFACTURED IN THE U.S.A. FROM A WOVEN MONOFILAMENT FABRIC THAT MEETS OR EXCEEDS THE FOLLOWING SPECIFICATIONS:

HI-FLOW DANDY BAG® (SAFETY ORANGE)

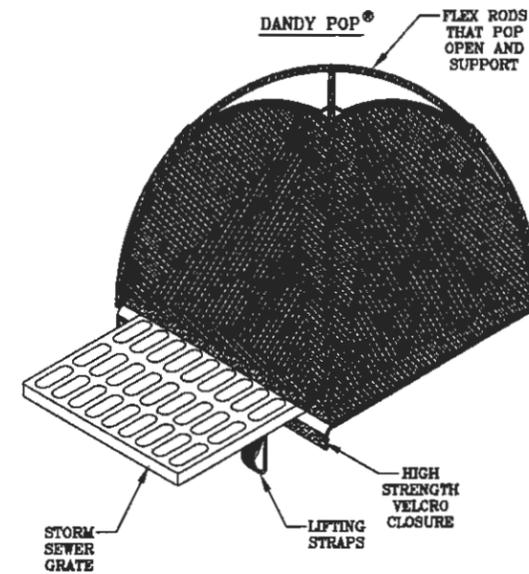
Mechanical Properties	Test Method	Units	MARV
Grab Tensile Strength	ASTM D 4632	kN (lbs)	1.62 (365) x 0.89 (200)
Grab Tensile Elongation	ASTM D 4632	%	24 x 10
Puncture Strength	ASTM D 4833	kN (lbs)	0.40 (90)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	3097 (450)
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.51 (115) x 0.33 (75)
UV Resistance	ASTM D 4355	%	90
Apparent Opening Size	ASTM D 4751	Mm (US Std Sieve)	0.425 (40)
Flow Rate	ASTM D 4491	l/min/m ² (gal/min/ft ²)	5907 (145)
Permittivity	ASTM D 4491	Sec ⁻¹	2.1

*Note: All Dandy Bags® can be ordered with our optional oil absorbent pillows



DETAIL OF INLET SEDIMENT CONTROL DEVICE

DANDY BAG SPECIFICATION



NOTE: THE DANDY SACK™ WILL BE MANUFACTURED IN THE U.S.A. FROM A WOVEN MONOFILAMENT FABRIC THAT MEETS OR EXCEEDS THE FOLLOWING SPECIFICATIONS:

DANDY POP® (BLACK & SAFETY ORANGE)

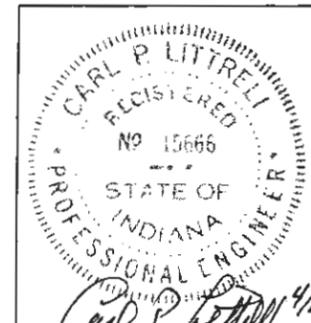
Mechanical Properties	Test Method	Units	MARV
Grab Tensile Strength	ASTM D 4632	kN (lbs)	1.62 (365) x 0.89 (200)
Grab Tensile Elongation	ASTM D 4632	%	24 x 10
Puncture Strength	ASTM D 4833	kN (lbs)	0.40 (90)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	3097 (450)
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.51 (115) x 0.33 (75)
UV Resistance	ASTM D 4355	%	90
Apparent Opening Size	ASTM D 4751	Mm (US Std Sieve)	0.425 (40)
Flow Rate	ASTM D 4491	l/min/m ² (gal/min/ft ²)	5907 (145)
Permittivity	ASTM D 4491	Sec ⁻¹	2.1

*Note: All Dandy Pops® can be ordered with our optional oil absorbent pillows

DETAIL OF INLET SEDIMENT CONTROL DEVICE

DANDY POP SPECIFICATION

NOTES:
* OR APPROVED EQUAL



No.	BY	DATE	REVISION	DATE
		1/12/2010		
			DRAWN RSG	
			CHECKED RAN	
			APRVD C.P.L.	
			SCALE	
			NONE	



DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

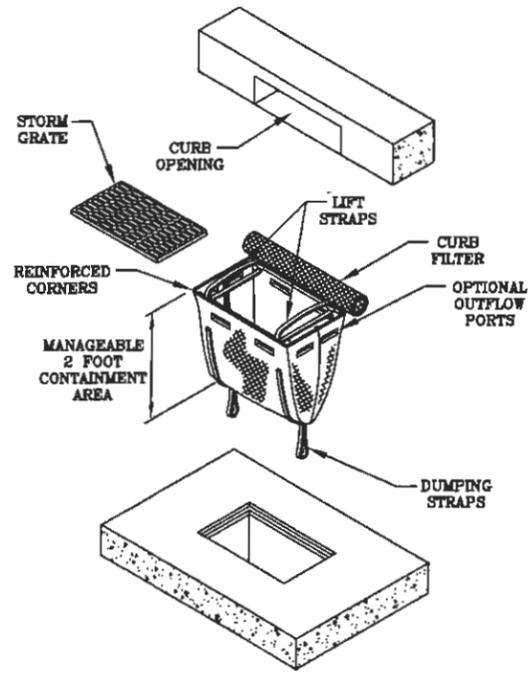
DIVISION	
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CONSTRUCTION BMP'S

STANDARD DRAWING

SHEET NO.
ES-2

DANDY CURB SACK™



NOTE: THE DANDY CURB SACK™ WILL BE MANUFACTURED IN THE U.S.A. FROM A WOVEN MONOFILAMENT FABRIC THAT MEETS OR EXCEEDS THE FOLLOWING SPECIFICATIONS:

REGULAR FLOW DANDY CURB SACK™ (BLACK)

Mechanical Properties	Test Method	Units	MARV
Grab Tensile Strength	ASTM D 4632	kN (lbs)	1.78 (400) x 1.40 (315)
Grab Tensile Elongation	ASTM D 4632	%	15 x 15
Puncture Strength	ASTM D 4833	kN (lbs)	0.87 (150)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	5508 (800)
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.67 (150) x 0.73 (165)
UV Resistance	ASTM D 4355	%	90
Apparent Opening Size	ASTM D 4751	Mm (US Std Sieve)	0.425 (40)
Flow Rate	ASTM D 4491	l/min/m ² (gal/min/ft ²)	2852 (70)
Permittivity	ASTM D 4491	Sec ⁻¹	0.90

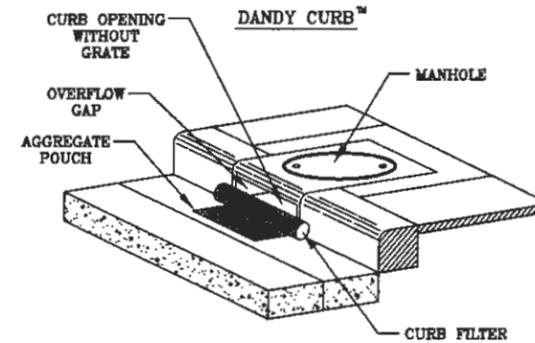
HI-FLOW DANDY CURB SACK™ (SAFETY ORANGE)

Mechanical Properties	Test Method	Units	MARV
Grab Tensile Strength	ASTM D 4632	kN (lbs)	1.62 (365) x 0.89 (200)
Grab Tensile Elongation	ASTM D 4632	%	24 x 10
Puncture Strength	ASTM D 4833	kN (lbs)	0.40 (90)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	3097 (450)
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.51 (115) x 0.33 (75)
UV Resistance	ASTM D 4355	%	90
Apparent Opening Size	ASTM D 4751	Mm (US Std Sieve)	0.425 (40)
Flow Rate	ASTM D 4491	l/min/m ² (gal/min/ft ²)	5907 (145)
Permittivity	ASTM D 4491	Sec ⁻¹	2.1

*Note: All Dandy Sacks™ can be ordered with our optional oil absorbent pillows

DETAIL OF INLET SEDIMENT CONTROL DEVICE WITH CURB FILTER

DANDY CURB SACK SPECIFICATION



DETAIL OF CURB INLET SEDIMENT CONTROL DEVICE WITH CURB FILTER

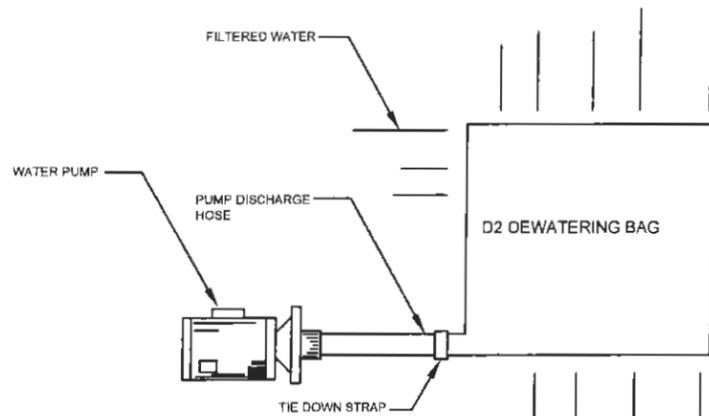
DANDY CURB SPECIFICATION

DANDY CURB™ (SAFETY ORANGE)

Mechanical Properties	Test Method	Units	MARV
Grab Tensile Strength	ASTM D 4632	kN (lbs)	1.62 (365) x 0.89 (200)
Grab Tensile Elongation	ASTM D 4632	%	24 x 10
Puncture Strength	ASTM D 4833	kN (lbs)	0.40 (90)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	3097 (450)
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.51 (115) x 0.33 (75)
UV Resistance	ASTM D 4355	%	90
Apparent Opening Size	ASTM D 4751	Mm (US Std Sieve)	0.425 (40)
Flow Rate	ASTM D 4491	l/min/m ² (gal/min/ft ²)	5907 (145)
Permittivity	ASTM D 4491	Sec ⁻¹	2.1

*Note: All Dandy Curbs™ can be ordered with our optional oil absorbents

NOTES:
* OR APPROVED EQUAL



DEWATERING BAG AND PUMP SIZE CHART

6' X 6', 10' X 15', AND 15' X 15'	2" TO 3" PUMP
15' X 25'	4" PUMP
15' X 35'	6" PUMP

CUSTOM SIZES AVAILABLE FOR LONG TERM OR SPECIALTY APPLICATIONS

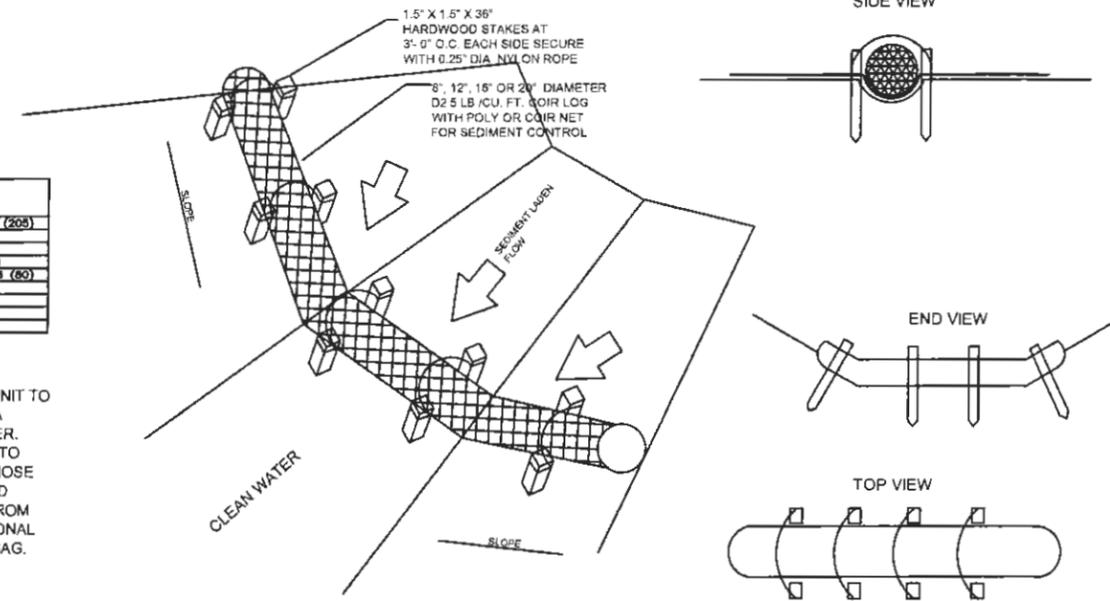
D2 DEWATERING BAG™

Mechanical Properties	Test Method	Units	MARV
Grab Tensile Strength	ASTM D 4632	kN (lbs)	0.9 (205) x 0.9 (205)
Grab Tensile Elongation	ASTM D 4632	%	90 x 90
Puncture Strength	ASTM D 4833	kN (lbs)	0.58 (130)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	2618 (380)
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.36 (80) x 0.36 (80)
UV Resistance	ASTM D 4355	%	70
Apparent Opening Size	ASTM D 4751	Mm (US Std Sieve)	0.180 (80)
Flow Rate	ASTM D 4491	l/min/m ² (gal/min/ft ²)	3866 (95)
Permittivity	ASTM D 4491	Sec ⁻¹	1.2

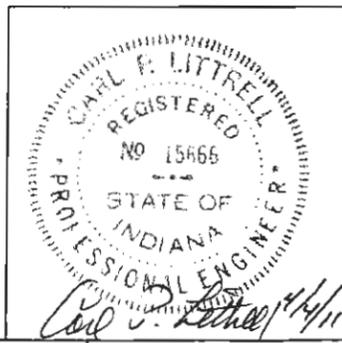
INSTALLATION AND MAINTENANCE GUIDELINES

INSTALLATION: PLACE LIFTING STRAPS (NOT INCLUDED) UNDER THE UNIT TO FACILITATE REMOVAL AFTER USE. UNFOLD D2 DEWATERING BAG ON A STABILIZED AREA OVER DENSE VEGETATION, STRAW OR OTHER COVER. PLACE BAG OVER OPEN GRADED STONE, SUCH AS INDOT #2 GRAVEL, TO ACHIEVE MAXIMUM FILTRATION AND DRAINAGE. INSERT DISCHARGE HOSE FROM PUMP INTO D2 DEWATERING BAG A MINIMUM OF SIX INCHES AND TIGHTLY SECURE WITH THE ATTACHED STRAP TO PREVENT WATER FROM FLOWING OUT OF THE UNIT WITHOUT BEING FILTERED. IF USING OPTIONAL ABSORBENTS, PLACE ABSORBENT BOOM INTO THE D2 DEWATERING BAG. CLIP ABSORBENT BOOM TO TETHER PROVIDED INSIDE THE UNIT.

MAINTENANCE: REPLACE THE UNIT WHEN 1/2 FULL OF SEDIMENT OR WHEN SEDIMENT HAS REDUCED THE FLOW RATE OF THE PUMP DISCHARGE TO AN IMPRACTICAL RATE. IF USING OPTIONAL OIL ABSORBENTS; REMOVE AND REPLACE ABSORBENT WHEN NEAR SATURATION.



D2 COIR LOG DITCH CHECK FOR SEDIMENT AND ENERGY CONTROL 006



No.	BY	DATE	REVISION	DATE
	RSG	1/12/2010		
	RAN			
	C.P.L.			
			SCALE	
			NONE	

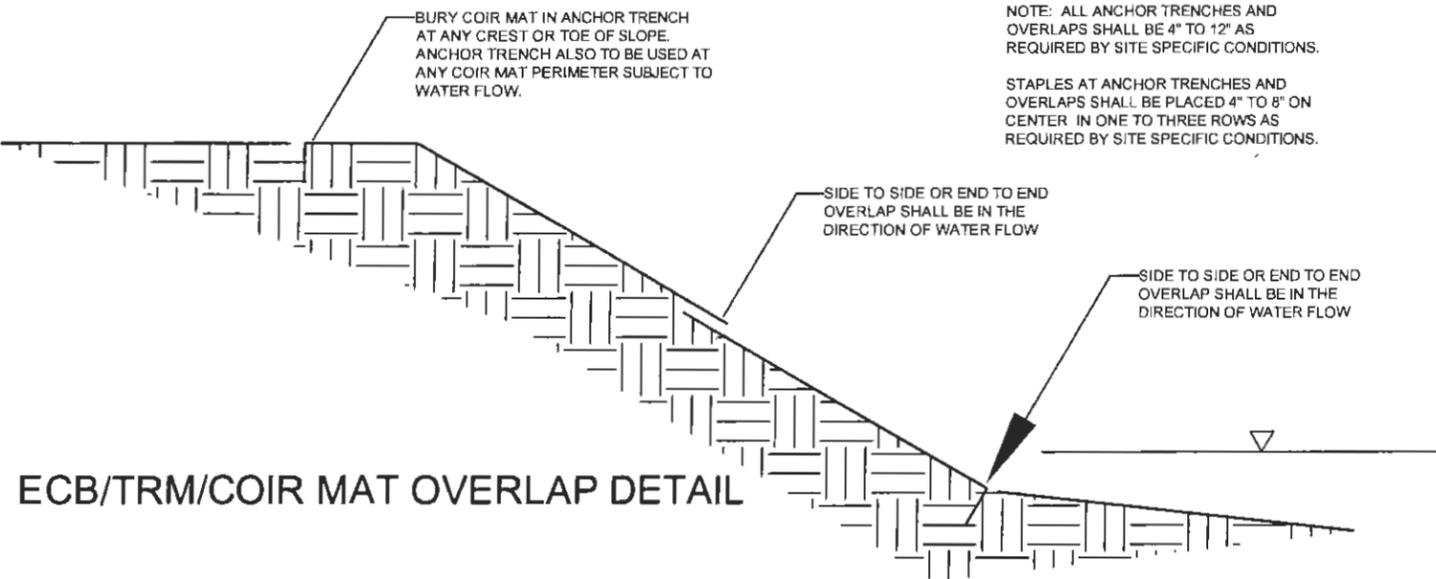


DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

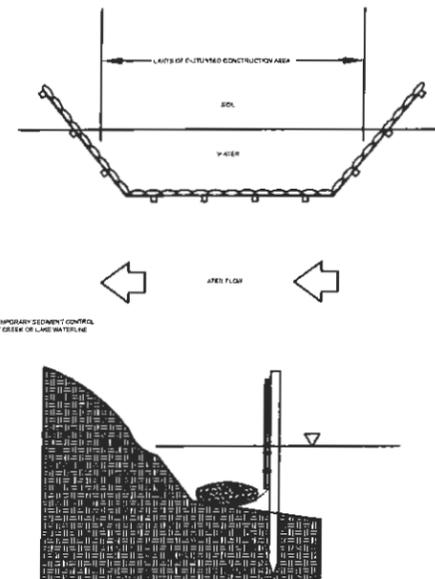
DIVISION	
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<input type="checkbox"/>	WATER
<input type="checkbox"/>	WASTE WATER

CONSTRUCTION BMP'S

STANDARD DRAWING
SHEET NO. ES-3



ECB/TRM/COIR MAT OVERLAP DETAIL



SILT FENCE AT THE WATERLINE SPECIFICATION AND INSTALLATION DETAIL

SILT FENCE 3' HIGH FLOW BELT STRAND REINFORCED GRAY NON-WOVEN 6' OC SPECIFICATION 090311

DESCRIPTION: SILT FENCE 3' HIGH FLOW BELT STRAND REINFORCED GRAY NON-WOVEN 6' OC SHALL CONSIST OF FOUR PARTS:

1. SILT FENCE 3' HIGH FLOW BELT STRAND REINFORCED GRAY NON-WOVEN GEOTEXTILE SHALL BE A 39 1/2" NON-WOVEN FILTER FABRIC MACHINE PRODUCED FROM 100% POLYPROPYLENE. GEOTEXTILE SHOULD BE DESIGNED SPECIFICALLY TO RETAIN SEDIMENT AND REMAIN HIGHLY PERMEABLE TO WATER. DESIRED CHARACTERISTICS INCLUDE SMALL PORE SIZE, HIGH U.V. RESISTANCE, HIGH PERMITTIVITY, AND A HIGH PERCENT OPEN AREA.
2. FULL 2" X 2" X 43" HARDWOOD STAKE WITH A SHARPENED POINT
3. NOMINAL 1/2" X 2" X 25 1/2" HARDWOOD LATH
4. 1.5" GS16 STAPLES

GEOTEXTILE PROPERTIES SILT FENCE 3' HIGH FLOW BELT STRAND REINFORCED GRAY NON-WOVEN 6' OC:

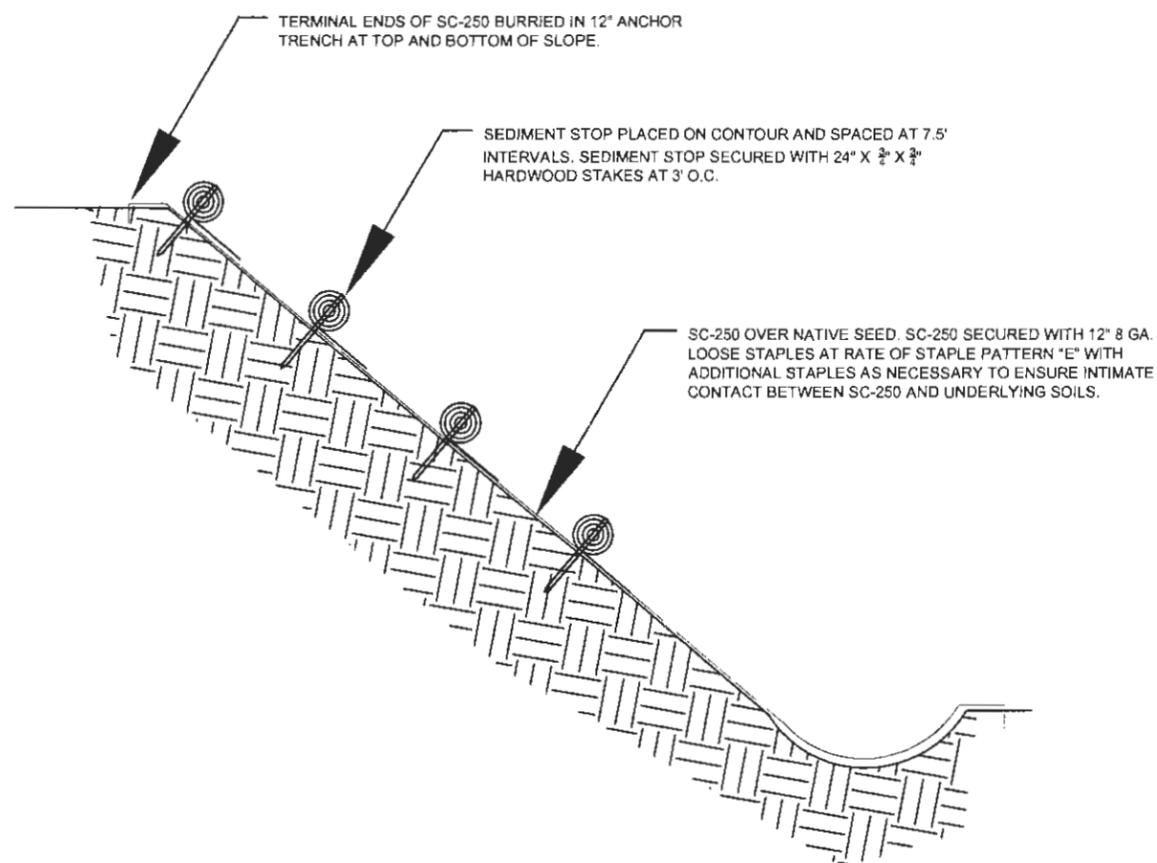
MECHANICAL/PHYSICAL PROPERTIES	DESCRIPTION/MINIMUM AVERAGE ROLL VALUES	TEST METHOD
STRUCTURE	NON-WOVEN	
REINFORCEMENT	BELT STRAND SCRIM	
POLYMER	POLYPROPYLENE	
MASS PER UNIT AREA	5.2 oz/sq. yd.	ASTM D3776
GRAB TENSILE STRENGTH MD	297 lbs.	ASTM D4632
GRAB TENSILE STRENGTH CD	223 lbs.	ASTM D4632
GRAB ELONGATION MD	58%	ASTM D4632
GRAB ELONGATION CD	59%	ASTM D4632
TRAP TEAR MD X CD	81 lbs. X 75 lbs.	ASTM D4533
MULLEN BURST STRENGTH	340 psi	ASTM D3786
PUNCTURE RESISTANCE	99 lbs	ASTM D4633
WATER FLOW RATE	192 gpm/sq.ft.	ASTM D4491
PERMITTIVITY	2.60 per. sec.	ASTM D4491
#60 SIEVE	ASTM D4751	
COLOR	Gray	

AOS (U.S. SIEVE)

ASSEMBLY: SILT FENCE 3' HIGH FLOW BELT STRAND REINFORCED GRAY NON-WOVEN 6' OC GEOTEXTILE SHALL BE ATTACHED TO HARDWOOD STAKES WITH HARDWOOD LATHS AND SECURED WITH FIVE 1 1/2" STAPLES. HARDWOOD STAKES SHALL BE 6" IN CENTER. THE BOTTOM 14 1/2" OF FABRIC SHALL BE LEFT UNSECURED TO ALLOW FOR ENTRENCHMENT.

PREPARATION/INSTALLATION: CREATE A 6" DEEP TRENCH ALONG PROPOSED FENCE LINE. DRIVE THE STAKES INTO THE TRENCH 8-12" OR UNTIL SECURE. BE SURE TO STRETCH FABRIC TAUT WHEN DRIVING STAKES. STAKES MUST BE INSTALLED ON THE DOWNHILL OR DOWNSTREAM SIDE OF FENCE. DRAPE LOOSE END OF GEOTEXTILE INTO TRENCH, THEN BACKFILL AND COMPACT SOIL ON BOTH SIDES.

AVAILABLE: D2 Land & Water Resource, INC. 2600 Bloyd Ave. Indianapolis, IN 46218.



SEDIMENT STOP APPLICATION 001

SILT FENCE 3' HIGH FLOW BELT STRAND REINFORCED GRAY NON-WOVEN 6' OC SPECIFICATION 090311

DESCRIPTION: SILT FENCE 3' HIGH FLOW BELT STRAND REINFORCED GRAY NON-WOVEN 6' OC SHALL CONSIST OF FOUR PARTS:

1. SILT FENCE 3' HIGH FLOW BELT STRAND REINFORCED GRAY NON-WOVEN GEOTEXTILE SHALL BE A 39 1/2" NON-WOVEN FILTER FABRIC MACHINE PRODUCED FROM 100% POLYPROPYLENE. GEOTEXTILE SHOULD BE DESIGNED SPECIFICALLY TO RETAIN SEDIMENT AND REMAIN HIGHLY PERMEABLE TO WATER. DESIRED CHARACTERISTICS INCLUDE SMALL PORE SIZE, HIGH U.V. RESISTANCE, HIGH PERMITTIVITY, AND A HIGH PERCENT OPEN AREA.
2. FULL 2" X 2" X 43" HARDWOOD STAKE WITH A SHARPENED POINT
3. NOMINAL 1/2" X 2" X 25 1/2" HARDWOOD LATH
4. 1.5" GS16 STAPLES

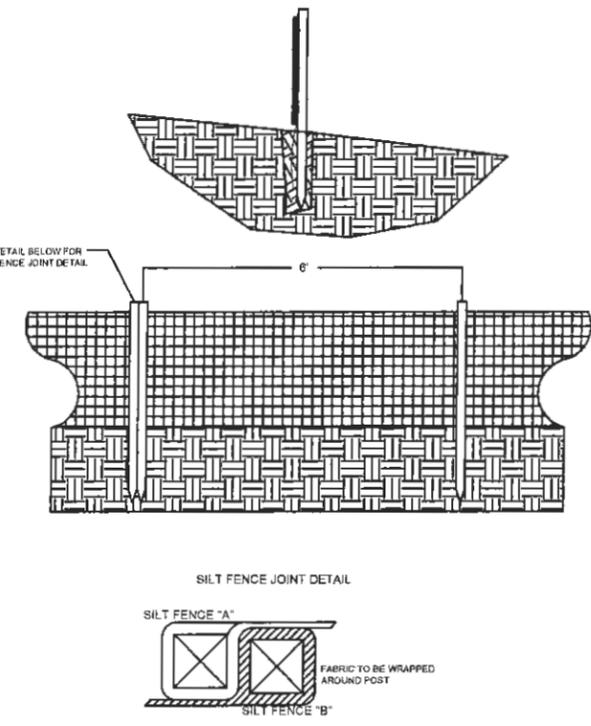
GEOTEXTILE PROPERTIES SILT FENCE 3' HIGH FLOW BELT STRAND REINFORCED GRAY NON-WOVEN 6' OC:

MECHANICAL/PHYSICAL PROPERTIES	DESCRIPTION/MINIMUM AVERAGE ROLL VALUES	TEST METHOD
STRUCTURE	NON-WOVEN	
REINFORCEMENT	BELT STRAND SCRIM	
POLYMER	POLYPROPYLENE	
MASS PER UNIT AREA	5.2 oz/sq. yd.	ASTM D3776
GRAB TENSILE STRENGTH MD	297 lbs.	ASTM D4632
GRAB TENSILE STRENGTH CD	223 lbs.	ASTM D4632
GRAB ELONGATION MD	58%	ASTM D4632
GRAB ELONGATION CD	59%	ASTM D4632
TRAP TEAR MD X CD	81 lbs. X 75 lbs.	ASTM D4533
MULLEN BURST STRENGTH	340 psi	ASTM D3786
PUNCTURE RESISTANCE	99 lbs	ASTM D4633
WATER FLOW RATE	192 gpm/sq.ft.	ASTM D4491
PERMITTIVITY	2.60 per. sec.	ASTM D4491
AOS (U.S. SIEVE)	#60 SIEVE	ASTM D4751
COLOR	Gray	

ASSEMBLY: SILT FENCE 3' HIGH FLOW BELT STRAND REINFORCED GRAY NON-WOVEN 6' OC GEOTEXTILE SHALL BE ATTACHED TO HARDWOOD STAKES WITH HARDWOOD LATHS AND SECURED WITH FIVE 1 1/2" STAPLES. HARDWOOD STAKES SHALL BE 6" IN CENTER. THE BOTTOM 14 1/2" OF FABRIC SHALL BE LEFT UNSECURED TO ALLOW FOR ENTRENCHMENT.

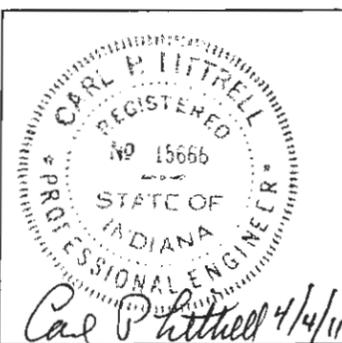
PREPARATION/INSTALLATION: CREATE A 6" DEEP TRENCH ALONG PROPOSED FENCE LINE. DRIVE THE STAKES INTO THE TRENCH 8-12" OR UNTIL SECURE. BE SURE TO STRETCH FABRIC TAUT WHEN DRIVING STAKES. STAKES MUST BE INSTALLED ON THE DOWNHILL OR DOWNSTREAM SIDE OF FENCE. DRAPE LOOSE END OF GEOTEXTILE INTO TRENCH, THEN BACKFILL AND COMPACT SOIL ON BOTH SIDES.

AVAILABLE: D2 Land & Water Resource, INC. 2600 Bloyd Ave. Indianapolis, IN 46218.



SILT FENCE SPECIFICATION AND INSTALLATION

NOTES:
* OR APPROVED EQUAL



No.	BY	DATE	REVISION	DATE
		1/12/2010		
			DRAWN RSG	
			CHECKED RAN	
			APRVD C.P.L.	
			SCALE	
			NONE	

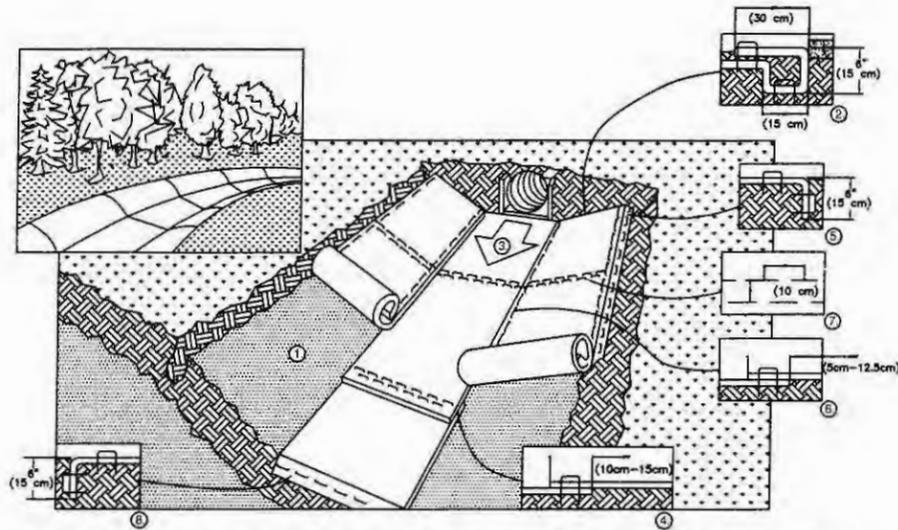


DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

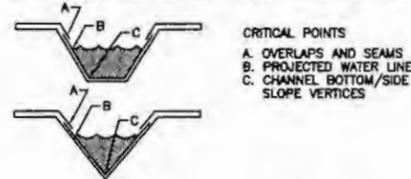
DIVISION
<input checked="" type="checkbox"/> CIVIL
<input type="checkbox"/> TRAFFIC
<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER

CONSTRUCTION BMP'S

STANDARD DRAWING
SHEET NO.
ES-4



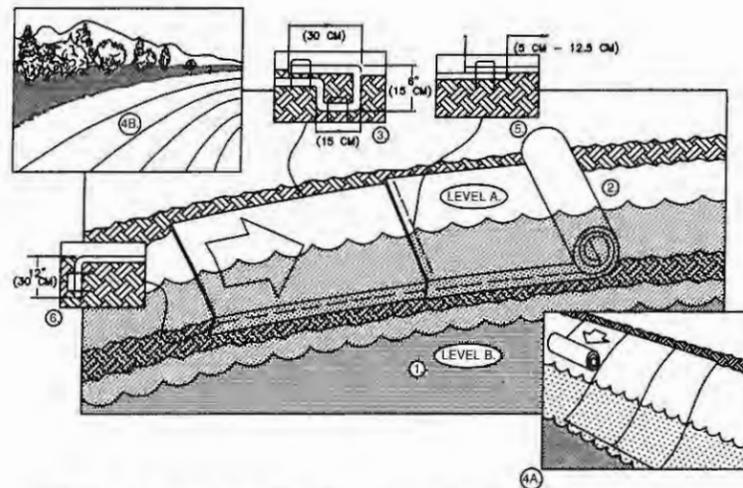
1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE BLANKET IN A 6" (15cm) DEEP X 6" (15cm) WIDE TRENCH WITH APPROXIMATELY 12" (30cm) OF BLANKET EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30cm) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30cm) PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30cm) APART ACROSS THE WIDTH OF THE BLANKET.
3. ROLL CENTER BLANKET IN DIRECTION OF WATER FLOW IN BOTTOM OF CHANNEL. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM[®], STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. PLACE CONSECUTIVE BLANKETS END OVER END (SHINGLE STYLE) WITH A 4"-6" (10cm-15cm) OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10cm) APART AND 4" (10cm) ON CENTER TO SECURE BLANKETS.
5. FULL LENGTH EDGE OF BLANKETS AT TOP OF SIDE SLOPES MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30cm) APART IN A 6" (15cm) DEEP X 6" (15cm) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
6. ADJACENT BLANKETS MUST BE OVERLAPPED APPROXIMATELY 2"-5" (5cm-12.5cm) (DEPENDING ON BLANKET TYPE) AND STAPLED. TO ENSURE PROPER SEAM ALIGNMENT, PLACE THE EDGE OF THE OVERLAPPING BLANKET (BLANKET BEING INSTALLED ON TOP) EVEN WITH THE COLORED SEAM STITCH[®] ON THE BLANKET BEING OVERLAPPED.
7. IN HIGH FLOW CHANNEL APPLICATIONS, A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 FOOT (9m-12m) INTERVALS. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10cm) APART AND 4" (10cm) ON CENTER OVER ENTIRE WIDTH OF THE CHANNEL.
8. THE TERMINAL END OF THE BLANKETS MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30cm) APART IN A 6" (15cm) DEEP X 6" (15cm) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.



CHANNEL INSTALLATION

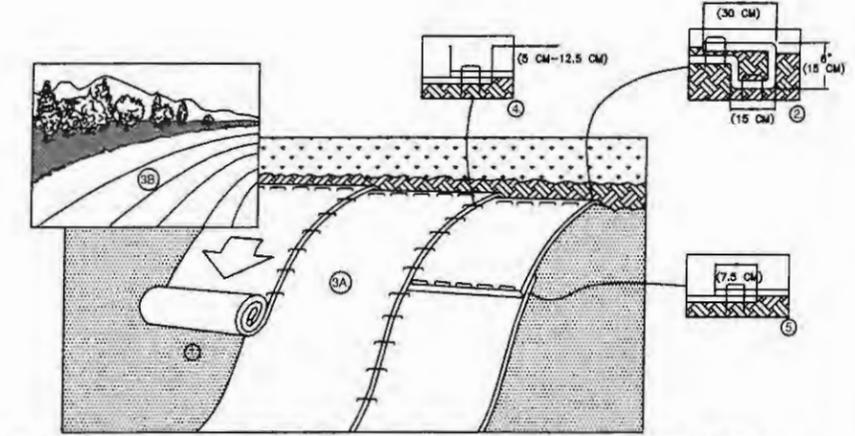
CRITICAL POINTS
 A. OVERLAPS AND SEAMS
 B. PROJECTED WATER LINE
 C. CHANNEL BOTTOM/SIDE SLOPE VERTICES

NOTE:
 * HORIZONTAL STAPLE SPACING SHOULD BE ALTERED IF NECESSARY TO ALLOW STAPLES TO SECURE THE CRITICAL POINTS ALONG THE CHANNEL SURFACE.
 ** IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 cm) MAY BE NECESSARY TO PROPERLY ANCHOR THE BLANKETS.



1. FOR EASIER INSTALLATION, LOWER WATER FROM LEVEL A TO LEVEL B BEFORE INSTALLATION.
2. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED NOTE: WHEN USING CELL-O-SEED, DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
3. BEGIN AT THE TOP OF THE SHORELINE BY ANCHORING THE BLANKET IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30 CM) OF BLANKET EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) APART ACROSS THE WIDTH OF THE BLANKET.
4. ROLL BLANKETS EITHER (A.) DOWN THE SHORELINE FOR LONG BANKS, (TOP TO BOTTOM) OR (B.) HORIZONTALLY ACROSS THE SHORELINE SLOPE. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM[®], STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
5. THE EDGES OF ALL HORIZONTAL AND VERTICAL BLANKET SEAMS MUST BE STAPLED WITH APPROXIMATELY 2" - 5" (5 CM - 12.5 CM) OVERLAP.
 NOTE:
 * SEAM OVERLAP SHOULD BE SHINGLED ACCORDING TO PREDOMINANT EROSION ACTION.
6. THE EDGE OF THE BLANKET AT OR BELOW NORMAL WATER LEVEL MUST BE ANCHORED BY PLACING THE BLANKET IN A 12" (30 CM) DEEP X 6" (15 CM) WIDE ANCHOR TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) APART IN THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING (STONE OR SOIL MAY BE USED AS BACKFILL).
 NOTE:
 * IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO PROPERLY ANCHOR THE BLANKETS.

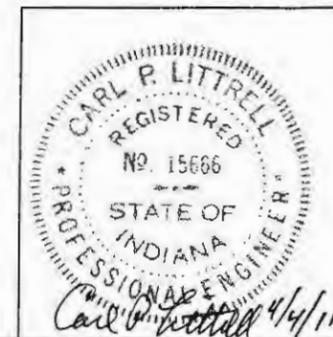
SHORELINE INSTALLATION



1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30cm) OF BLANKET EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) APART ACROSS THE WIDTH OF THE BLANKET.
3. ROLL THE BLANKETS (A.) DOWN OR (B.) HORIZONTALLY ACROSS THE SLOPE. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM[®], STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 2" - 5" (5 CM - 12.5 CM) OVERLAP DEPENDING ON BLANKET TYPE.
5. CONSECUTIVE BLANKETS SPICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" (7.5 CM) OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" (30 CM) APART ACROSS ENTIRE BLANKET WIDTH.
 NOTE:
 * IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO PROPERLY SECURE THE BLANKETS.

SLOPE INSTALLATION

NOTES:
 * OR APPROVED EQUAL



No.	BY	DATE	REVISION	DATE
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				DRAWN RSG
				CHECKED RAN
				APRVD C.P.L.
				SCALE
				NONE



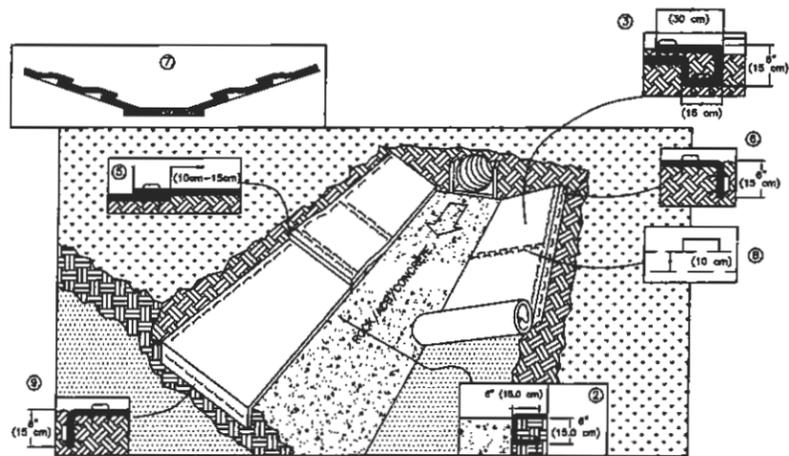
DEPARTMENT OF PUBLIC WORKS
 CITY OF SOUTH BEND, INDIANA

DIVISION
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<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER

POST CONSTRUCTION BMP'S

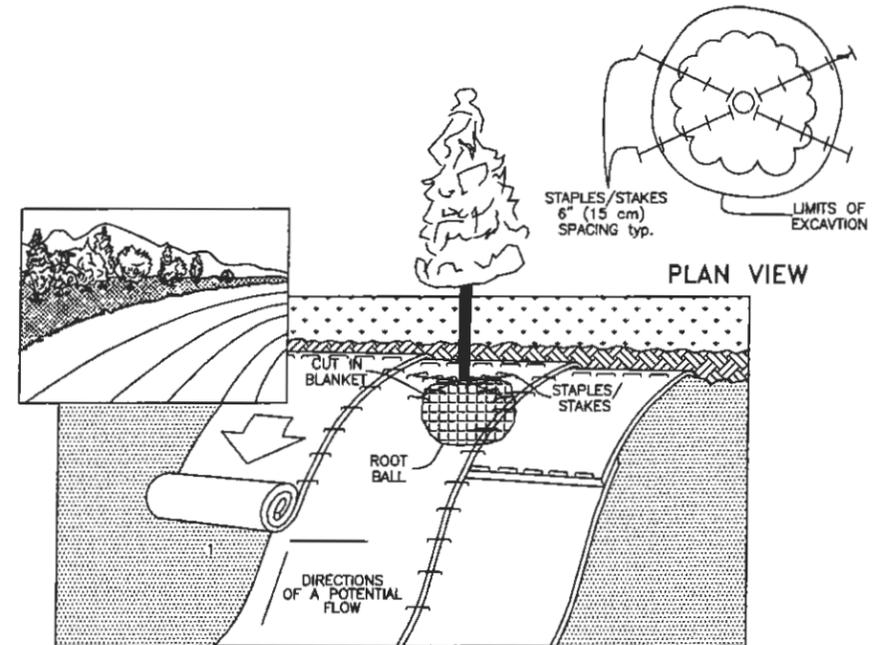
STANDARD DRAWING

SHEET NO.
 ES-6



1. Prepare soil before installing the rolled erosion control products (RECPs), including any necessary application of lime, fertilizer, and seed. note: when using Cell-O-Seed do not seed prepared area. Cell-O-Seed must be installed with paper side down.
2. Begin by excavating a 6" (15 cm) deep X 6" (15 cm) wide trench along the edge of the rock/concrete/articulated concrete block (ACB) low flow channel liner. Unroll the RECPs along the soil surface and then flip the RECPs over onto the rock/concrete/ACB low flow channel liner. After flipping the RECPs over (the RECP's topside is exposed when blanket is unrolled must invert so this side is against ACB/concrete surface, only for note placed at base of side slopes), extend one end of the RECP into the anchor trench. Anchor the blanket with a row of staples/stakes approximately 12" (30 cm) apart in the bottom of the trench. Backfill and compact the trench after stapling. Apply seed to compacted soil and fold remaining RECPs back over seed and compacted soil up the side slope of the channel. RECPs may also be tamped in under the rock/ACB/concrete low flow channel liner.
3. At the beginning of the channel excavate a 6" (15 cm) deep X 6" (15 cm) wide anchor trench and secure the RECPs into the trench with approximately 12" (30 cm) of material extended beyond the trench. Anchor the RECPs with a row of staples/stakes approximately 12" (30 cm) apart in the bottom of the trench. Backfill and compact the trench after stapling. Apply seed to compacted soil and fold remaining RECPs back over seed and compacted soil. Secure RECPs over compacted soil with a row of staples/stakes spaced approximately 12" (30 cm) apart across the width of the RECPs.
4. All RECPs must be securely fastened to soil surface by placing staples/stakes in appropriate locations as shown in the staple pattern guide. When using the DUT System(tm), staples/stakes should be placed through each of the colored dots corresponding to the appropriate staple pattern.
5. Place consecutive RECPs end over end (shingle style) with a 4" - 6" (10 cm - 15 cm) overlap. Use a double row of staples staggered 4" (10 cm) apart and 4" (10 cm) on center to secure RECPs.
6. Full length edge of the RECPs at top of side slopes must be anchored with a row of staples/stakes approximately 12" (30 cm) apart in a 6" (15 cm) deep X 6" (15 cm) wide trench. Backfill and compact the trench after stapling.
7. Adjacent RECPs must be overlapped approximately 2" - 5" (5 cm - 12.5 cm) (depending on blanket type) and stapled. To ensure proper seam alignment, place the edge of the overlapping RECPs (blanket being installed on top) even with the colored Seam Stitch(tm) on the RECP being overlapped.
8. In high flow channel applications, a staple check slot is recommended at 30 to 40 foot (9m - 12m) intervals. Use a double row of staples staggered 4" (10 cm) apart and 4" (10 cm) on center over entire width of the channel.
9. The terminal end of the RECPs must be anchored with a row of staples/stakes approximately 12" (30 cm) apart in a 6" (15 cm) deep X 6" (15 cm) wide trench. Backfill and compact the trench after stapling.
note: horizontal staple spacing should be altered if necessary to allow staples to secure the critical points along the channel surface.
In loose soil conditions, the use of staple or stake lengths greater than 6" (15 cm) may be necessary to properly anchor the RECPs.

RECP & ROCK/ACB/CONCRETE INTERFACE



1. INSTALL BLANKETS USING APPROPRIATE STAPLE PATTERN AND ACCORDING TO APPLICATION REQUIREMENTS (I.E. SLOPE, CHANNEL, OR SHORELINE). CUT AN "X" PARALLEL TO PREDOMINANT FLOW DIRECTION THROUGH THE BLANKET USING SCISSORS OR UTILITY KNIFE. THE LENGTH OF CUTS SHOULD EXCEED THE DIAMETER OF THE PLANTS ROOT BALL BY APPROXIMATELY 12" (30cm WITHOUT LIMITING PLANT PLACEMENT ACTIVITIES (I.E. PLANT ROOT BALL EQUALS 6" (15cm) CUT "X" 18 (46cm) IN LENGTH).

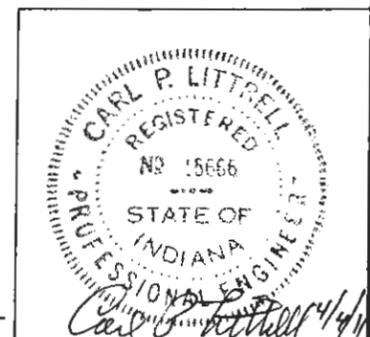
NOTE: IF PLANT ROOT BALL DOES NOT EXCEED 3" (8cm) IN DIAMETER THEN SIMPLY CUT A SINGLE CUT PARALLEL TO PREDOMINANT FLOW DIRECTION. THE CUT ONLY NEEDS TO EXCEED ROOT BALL DIAMETER BY APPROXIMATELY 6" (15cm).

CAUTION: DO NOT PLACE EXCAVATED SOIL FROM PLANTING PROCESS ON BLANKET. THIS MAY RESULT IN DAMAGE TO THE BLANKET AND REDUCED EROSION CONTROL PERFORMANCE.
2. AFTER PLACING PLANT AND REPLACING PREVIOUSLY REMOVED SOIL FOLD FLAPS OF BLANKET BACK INTO PLACE.
3. STAPLE/STAKE CUTS CLOSED STARTING AS CLOSE TO THE PLANT STEM AS POSSIBLE AND CONTINUE PLACING STAPLES EVERY 6" (15cm) WORKING OUTWARDS (SEE PLAN VIEW ABOVE).
4. CONTINUE PLACING STAPLES ALONG SEAM UNTIL ALL CUTS HAVE BEEN SECURELY FASTENED CLOSED (SEE DIAGRAM ABOVE).

NOTE: IN SOME INSTANCES ADDITIONAL BLANKET MAY BE REQUIRED TO PROTECT ALL EXPOSED SOIL DUE TO MOUNDING ASSOCIATED WITH PLANTS ROOT BALL INSTALLATION.

LIVE PLANT INSTALLATION THROUGH RECPS

NOTES:
* OR APPROVED EQUAL



No.	BY	DATE	REVISION	DATE
				1/12/2010
				DRAWN RSG
				CHECKED RAN
				APRVD C.P.L.
				SCALE
				NONE



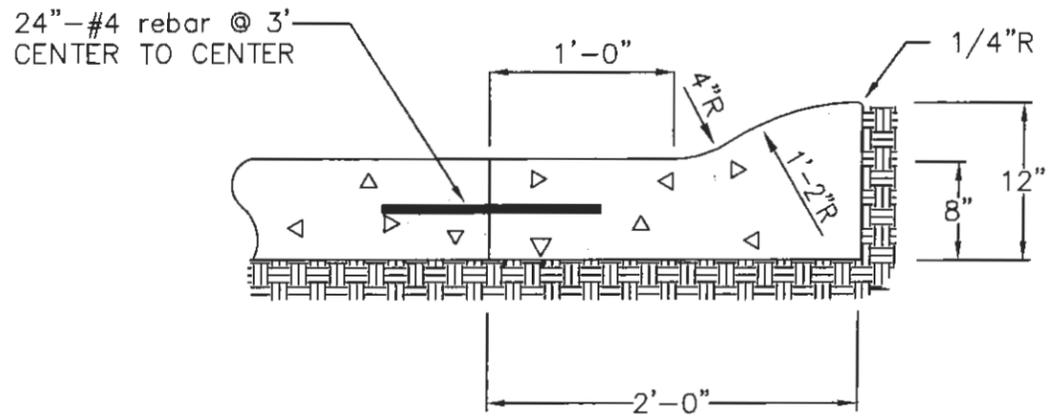
DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION	
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<input type="checkbox"/>	WASTE WATER
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POST CONSTRUCTION BMP'S

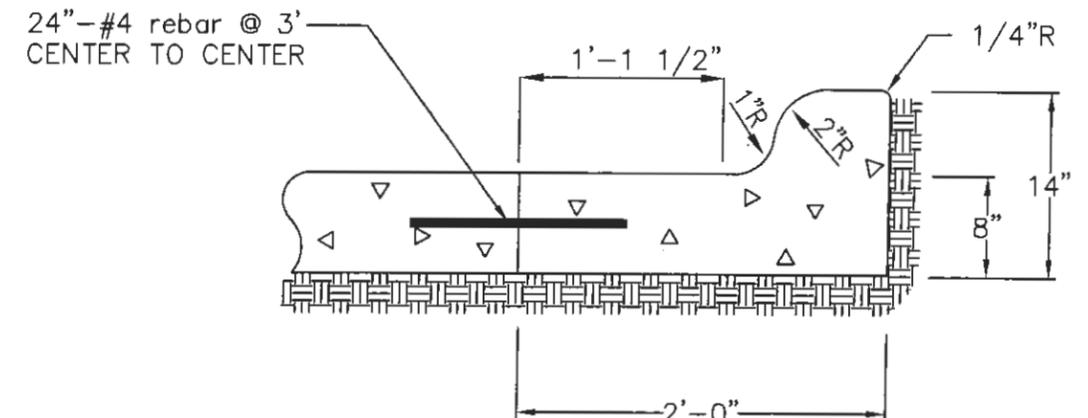
STANDARD DRAWING

SHEET NO.
ES-7



COMBINATION CURB & GUTTER

TYPE A

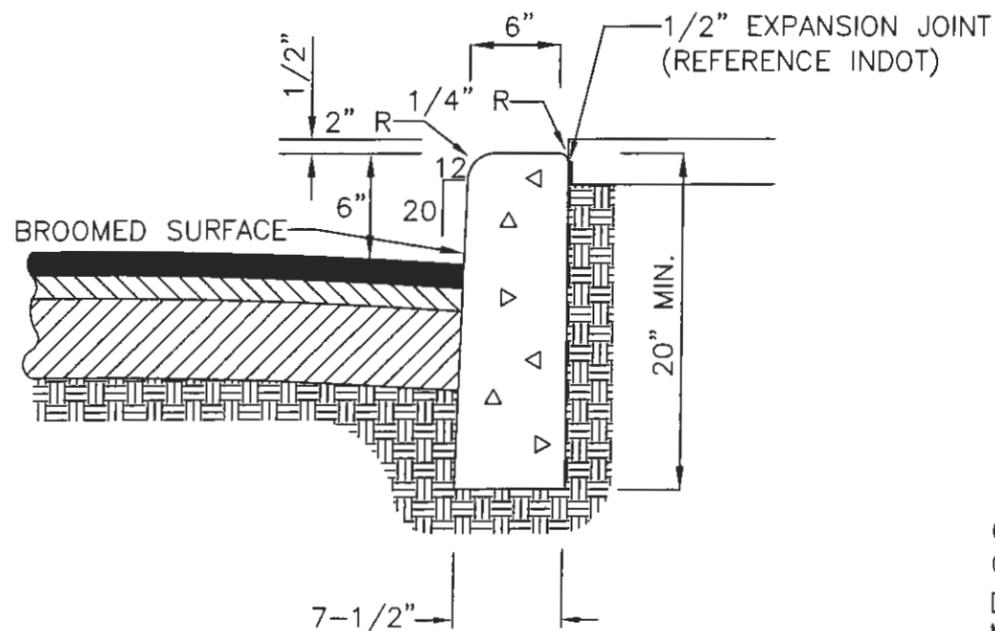


COMBINATION CURB & GUTTER

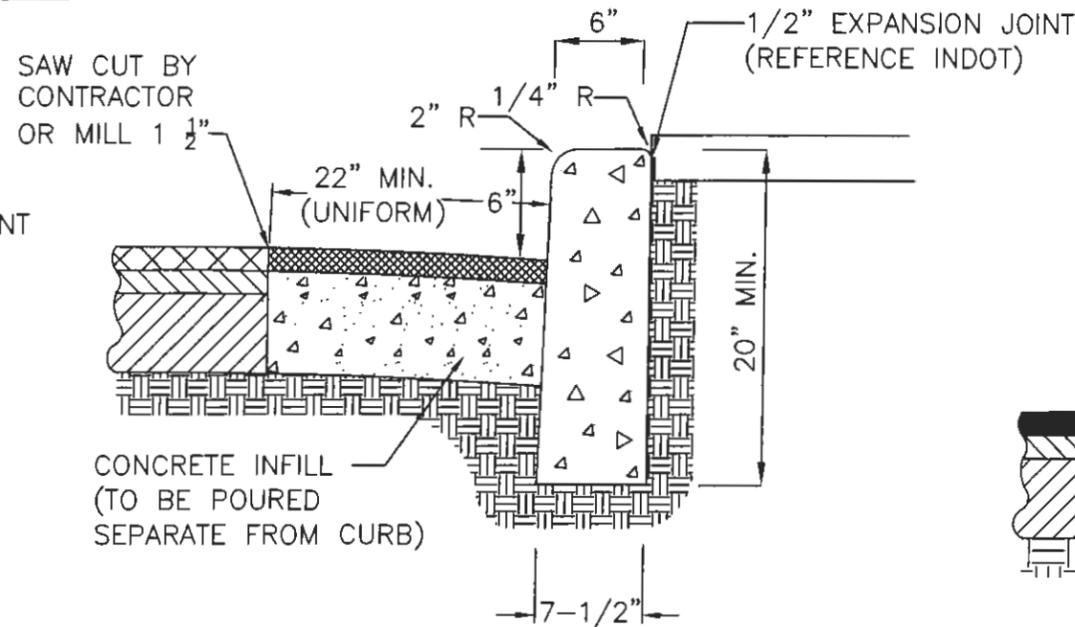
TYPE B

NOTE:
ELIMINATE #4 REBAR IF ROADWAY IS ASPHALTIC CONCRETE

NOTE:
ELIMINATE PINNING IF ROADWAY IS ASPHALTIC CONCRETE



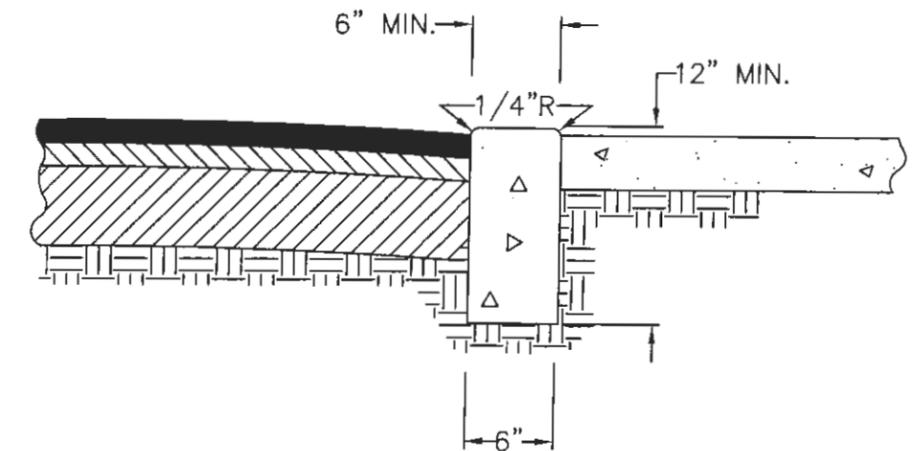
STANDARD CURB



MODIFIED COMBINATION

CURB PLACED AS STANDARD CURB WITH SEPARATE POURED GUTTER. PLACE SURFACE 22" OUT FROM FACE OF CURB AT A DEPTH OF 1 1/2" OR CURB AND GUTTER CAN BE PLACED MONOLITHICALLY.

NOTE:
1. ALL CURB TO BE CONSTRUCTED OF CLASS "A" CONCRETE.
2. CONTROL JOINTS TO BE PLACED EVERY 10'.
3. EXPANSION JOINTS TO BE PLACED EVERY 80' OR AS SPECIFIED ON CONSTRUCTION DRAWINGS.



STANDARD HEADER

NOTE:
USED TO SEPARATE DISPARATE TYPES OF PAVEMENT ONLY

9	RSG	1/18/11	REVISED CONC. INFILL ON MODIFIED COMBINATION
8	RSG	9/30/09	EDIT DIMENSIONS AND NOTES
7	RSG	1/22/08	ADD 6" CURB EXPOSURE
6	JRP	2/18/03	ADD MODIFIED COMBINATION
No.	BY	DATE	REVISION
5	JRP	4/2/02	EDIT DIMENSIONS ON TYPE A & B
4	JRP	11/28/01	REVISED BORDER & TEXT SIZE
3	H.K.	3/22/01	
2	D.M.	5/16/00	SCALE
1	DRW	2/93	NONE

DATE	7-3-89
DRAWN	EJL
CHECKED	TV
APRVD	CPL
SCALE	
NONE	

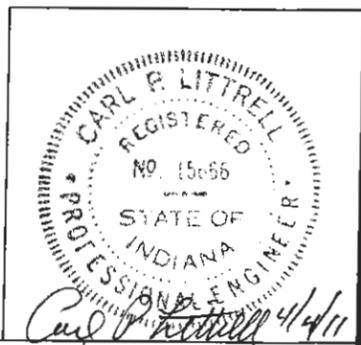


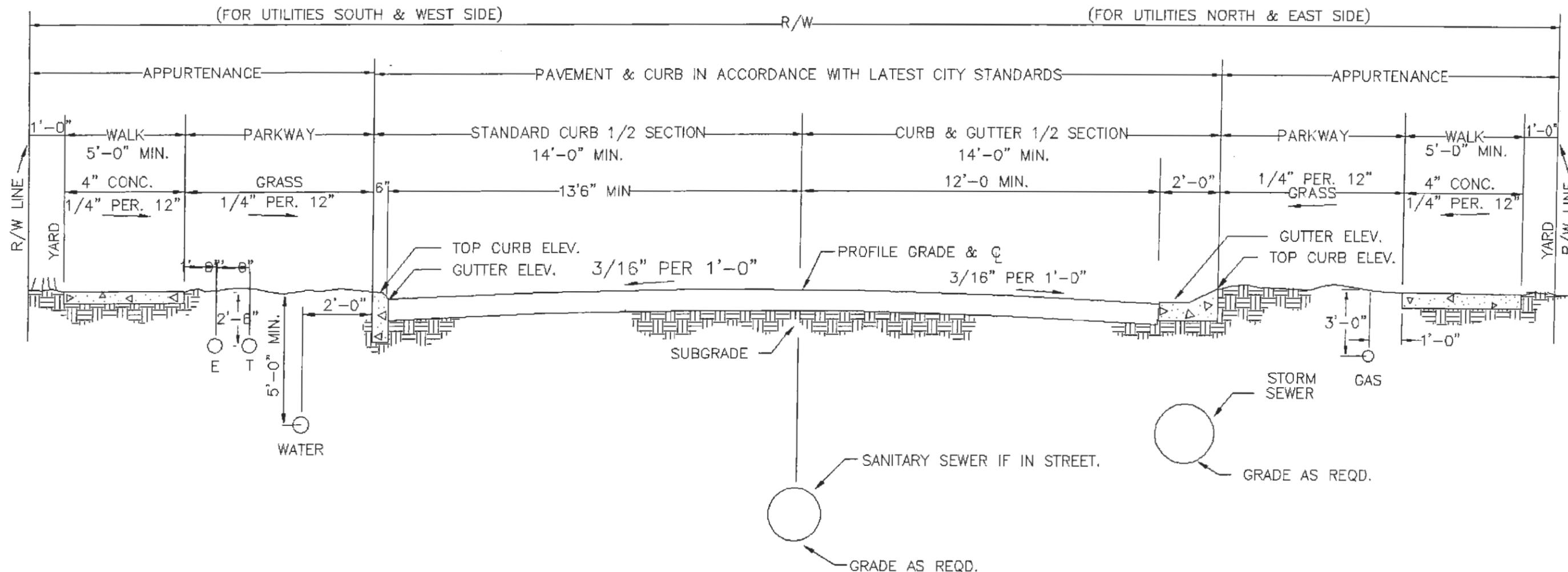
DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION	<input checked="" type="checkbox"/> CIVIL
	<input type="checkbox"/> TRAFFIC
	<input type="checkbox"/> WATER
	<input type="checkbox"/> WASTE WATER

CONCRETE CURB

STANDARD DRAWING
SHEET NO.
SC-1

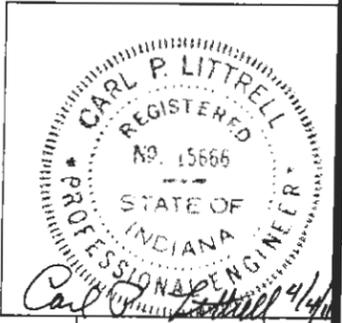




- NOTES:**
1. WHERE FEASIBLE IT IS RECOMMENDED THAT PUBLIC UTILITIES BE INSTALLED BETWEEN THE BACK OF CURB AND BACK OF SIDEWALK.
 2. RIGHT OF WAY WIDTH IN ACCORDANCE WITH THE APPROVED PLAT, BUT A MINIMUM OF 50' IS REQUIRED.
 3. SIDEWALK WIDTH IS TO BE 5 FT. MINIMUM. CONCRETE SIDEWALK MAY BE INFILLED TO CURB IN COMMERCIAL ZONES. NO ASPHALT SHALL BE USED FOR INFILL.
 4. MAXIMUM GRADIENT ON STREETS AND SIDEWALKS SHALL BE 5%, 8% ON COLLECTORS AND MINOR STREETS
 5. MINIMUM GRADIENT SHALL BE NOT LESS THAN THREE-TENTHS (0.3) OF ONE (1) PERCENT AT GUTTER.

STANDARD DRAWING REFERENCE

- CURBS- SC- 1.
- PAVEMENT DESIGN- FLEXIBLE- SP- 1.
- PAVEMENT THICKNESS- MIN- SP-2.
- DRIVEWAYS- SW- 1.
- SIDEWALKS- SW- 1.



No.	BY	DATE	REVISION	DATE	7-11-89
1	DRW	2/93		DRAWN	EJL
2	DM	5/10/00		CHECKED	TV
3	HK	3/22/01		APRVD	CPL
4	JRP	11/28/01	REVISED BORDER & TEXT SIZE		SCALE NONE

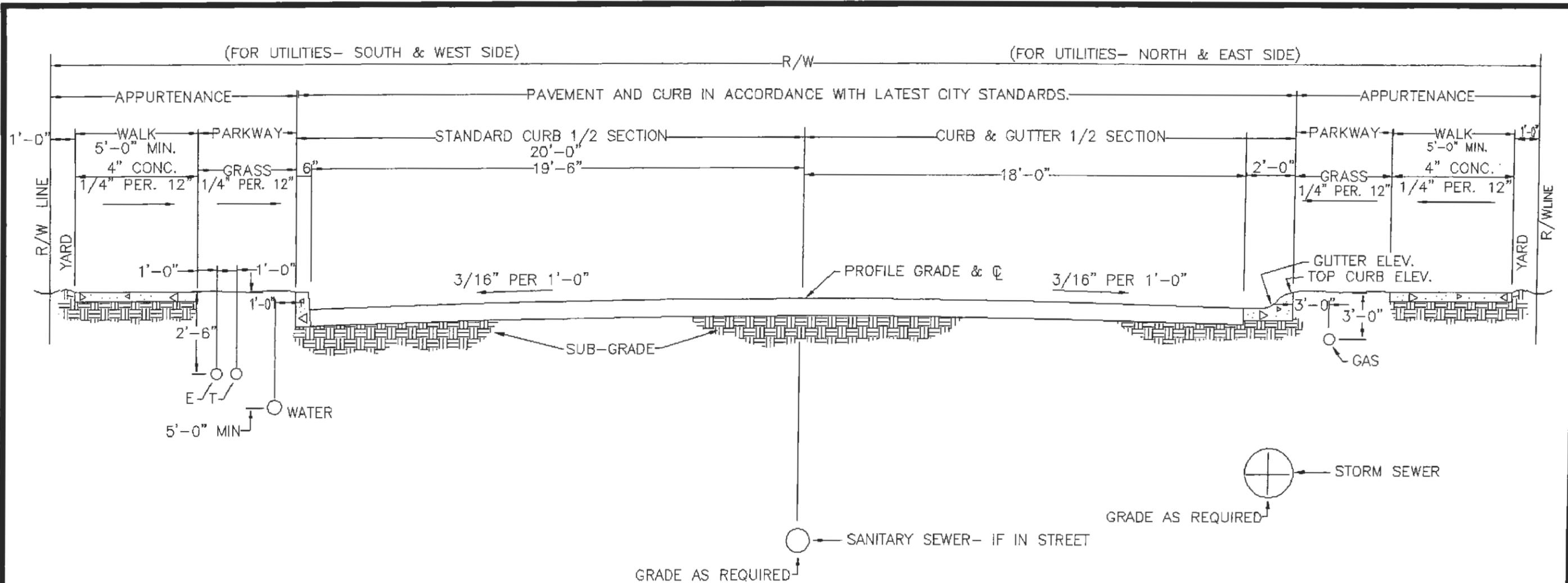


DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION
<input checked="" type="checkbox"/> CIVIL
<input type="checkbox"/> TRAFFIC
<input type="checkbox"/> WATER
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MINOR STREET SECTION

STANDARD DRAWING
SHEET NO.
SG-1

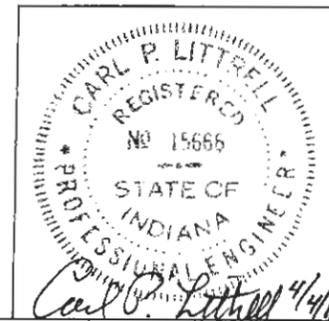


NOTES:

1. WHERE FEASIBLE IT IS RECOMMENDED THAT PUBLIC UTILITIES BE INSTALLED BETWEEN THE BACK OF CURB AND BACK OF SIDEWALK.
2. RIGHT OF WAY WIDTH IN ACCORDANCE WITH THE APPROVED PLAT, BUT A MINIMUM OF 50' IS REQUIRED.
3. SIDEWALK WIDTH IS TO BE 5 FT. MINIMUM. CONCRETE SIDEWALK MAY BE INFILLED TO CURB IN COMMERCIAL ZONES. NO ASPHALT SHALL BE USED FOR INFILL.
4. MAXIMUM GRADIENT ON STREETS AND SIDEWALKS SHALL BE 5%, 8% ON COLLECTORS AND MINOR STREETS
5. MINIMUM GRADIENT SHALL BE NOT LESS THAN THREE-TENTHS (D.3) OF ONE (1) PERCENT AT GUTTER.

STANDARD DRAWING REFERENCE

- CURBS- SC- 1.
- PAVEMENT DESIGN- FLEXIBLE- SP- 1.
- PAVEMENT THICKNESS- MIN- SP-2.
- DRIVEWAYS- SW- 1.
- SIDEWALKS- SW- 1.



No.	BY	DATE	REVISION	DATE	7-14-89
1	DRW	2/93		DRAWN	EJL
2	DM	5/10/00		CHECKED	TV
3	HK	3/22/01		APRVD	CPL
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DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION	
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<input type="checkbox"/>	WATER
<input type="checkbox"/>	WASTE WATER

COLLECTOR STREET SECTION

STANDARD DRAWING
SHEET NO.
SG-2

AASHTO EQUATION

SN = $a_1 D_1 + a_2 D_2 + a_3 D_3$
 SN = Structural Number
 $a_1 - a_2 - a_3$ = coeff. relative strength
 D_3 = thickness - bit. surf. - inches
 D_2 = thickness - base - inches
 D_1 = thickness - subbase - inches

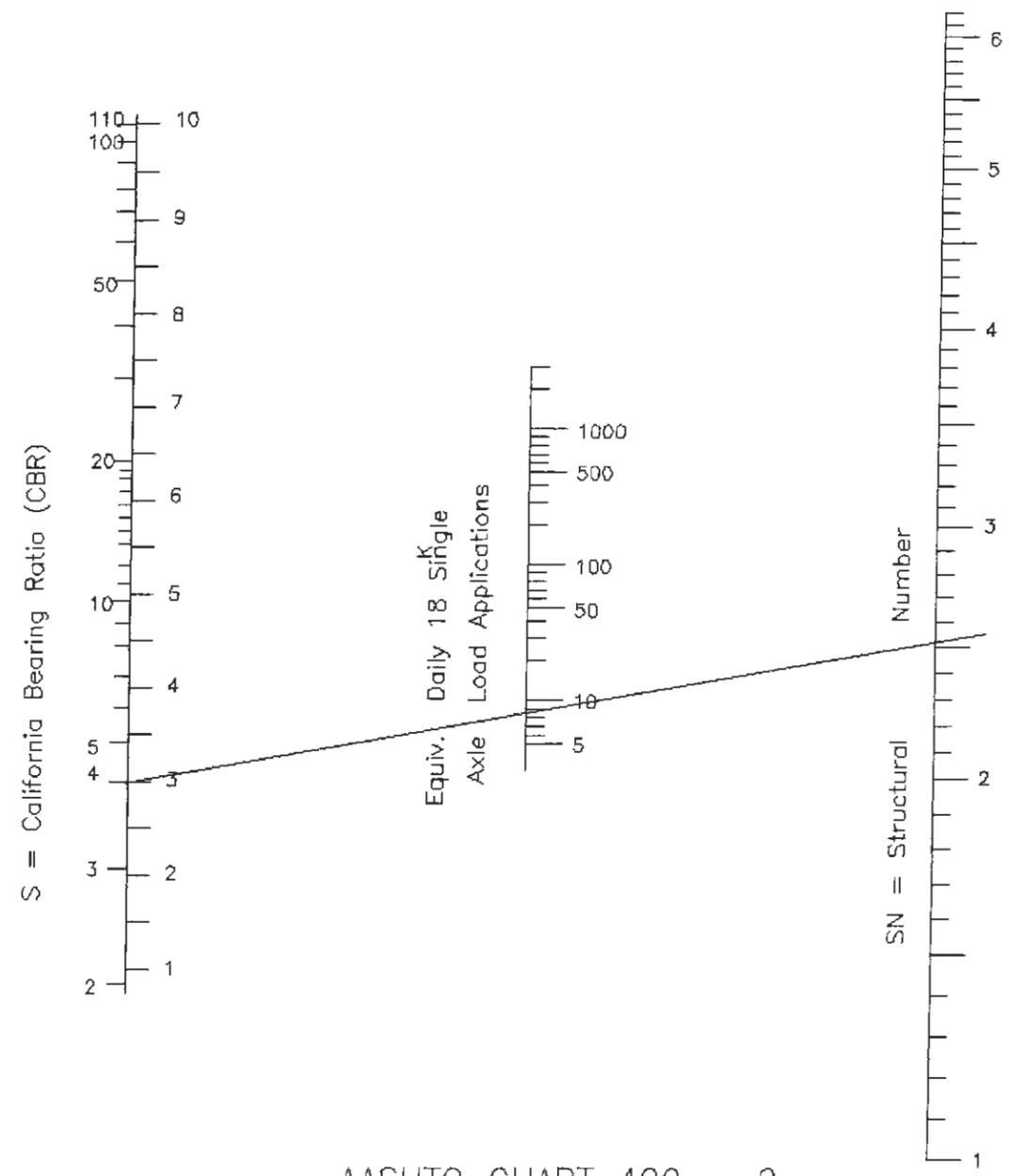
DESIGN CRITERIA

- *S = CBR 4; SSV 3 - other by Laboratory Analysis
- * 18^k Axles = 8 - Minor Streets
 40 - Collector Streets
 Others by special Traffic Analysis
- a_1 = 0.11 - Subbase, Ty I or II except NO. 30
 0.07 Subbase NO. 30
- a_2 = 0.07 - Comp. Agg. Base 53 or 73
 = 0.14 - Crushed Stone Base 53 or 73
- * = 0.34 - Soil Cement Base (Not Cem. Treated)
- * = 0.36 - Bit. Coated Agg. Base 53 or 73 with AP
- * = other types by special analysis
- a_3 = 0.44 H.A.C. Surface A,B, or C
 = 0.40 - H.A.E. Surface Ty. IV
- D_1 = 4" min. when used
- D_2 = 4" min
- D_3 = 2" min.

* These values are local criteria . All others from AASHTO.

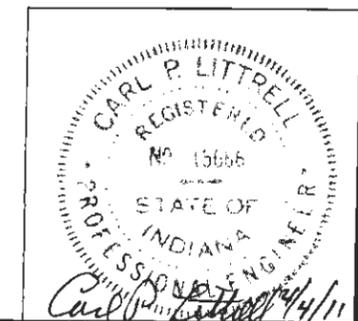
EXAMPLE

- Given = CBR = 4 & 18^k = 8. SN = 2.51 is req'd.
- 1) 6" Bit Base & 1" Bit. Surf. C
 $SN = (1 \times 0) + (0.36 \times 6) + (0.44 \times 1) = 2.60$
 - 2) 6" S.C. Base & 2" Bit. Surf. (Binder & C)
 $SN = (1 \times 0) + (6 \times 0.34) + (2 \times 0.44) = 2.92$
 - 3) 5" Subbase I Or II; 9" CAB & 3" Bit. Surf. (Binder & C)
 $SN = (5 \times 0.11) + (9 \times 0.07) + (3 \times 0.44) = 2.50$



AASHTO CHART 400 - 2

20 Year Traffic Analysis
 Serviceability Index - 2.5



No.	BY	DATE	REVISION	DATE	7-18-89
1	D.M.	5/10/00		DRAWN	EJL
2	H.K.	3/22/01		CHECKED	TV
3	JRP	11/28/01	REVISED BORDER & TEXT SIZE	APRVD	CPL
				SCALE	NONE



DEPARTMENT OF PUBLIC WORKS
 CITY OF SOUTH BEND, INDIANA

DIVISION
<input checked="" type="checkbox"/> CIVIL
<input type="checkbox"/> TRAFFIC
<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER

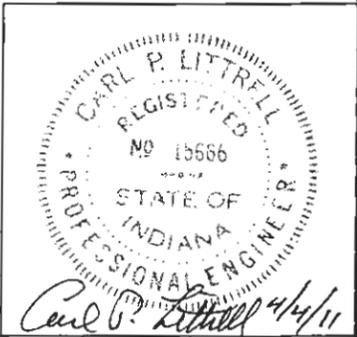
FLEXIBLE PAVEMENT
 DESIGN CHART

STANDARD
 DRAWING
 SHEET NO.
 SP-1

MINIMUM PAVEMENT THICKNESS REQUIREMENT.							
STREET CATEGORY	TYPE	PLAIN CEMENT CONC.	SUBBASE	BITUM. BASE	BITUM. BINDER	BITUM. SURFACE	SN
CLASS C MINOR (SN=2.51)	I	8"	6"				NA
	II		6"		2"(220#/sy)	1"(110#/sy)	2.53
	III		6"	6"(660#/sy)		1"(110#/sy)	2.60
	IV			6"(660#/sy)	2"(220#/sy)	1"(110#/sy)	2.75
CLASS B COLLECTOR (SN=3.25)	I	10"	8"				NA
	II			7"(770#/sy)	1"(110#/sy) OR	1"(110#/sy) 2"(220#/sy)	3.40
	III			8"(880#/sy)	2"(220#/sy)	1"(110#/sy)	3.26
	IV						
CLASS A MAJOR	TO BE DESIGNED ON SPECIAL BASIS AT ALL TIMES.						

NOTES:

- 1- SEE STANDARD DRAWING SP-1 FOR METHOD OF DESIGNING FLEXIBLE PAVEMENT.
- 2- SEE PREVAILING SPECIFICATIONS FOR METHOD OF TESTING EXISTING SOIL SUBBASE PURPOSES.



No.	BY	DATE	REVISION	DATE	7-11-89
1	D.M.	5/10/00		DRAWN	EJL
2	H.K.	3/22/01		CHECKED	TV
3	JRP	11/28/01	REVISED BORDER & TEXT SIZE	APRVD	CPL
4	RSG	1/18/11	SUBBASE		SCALE NONE

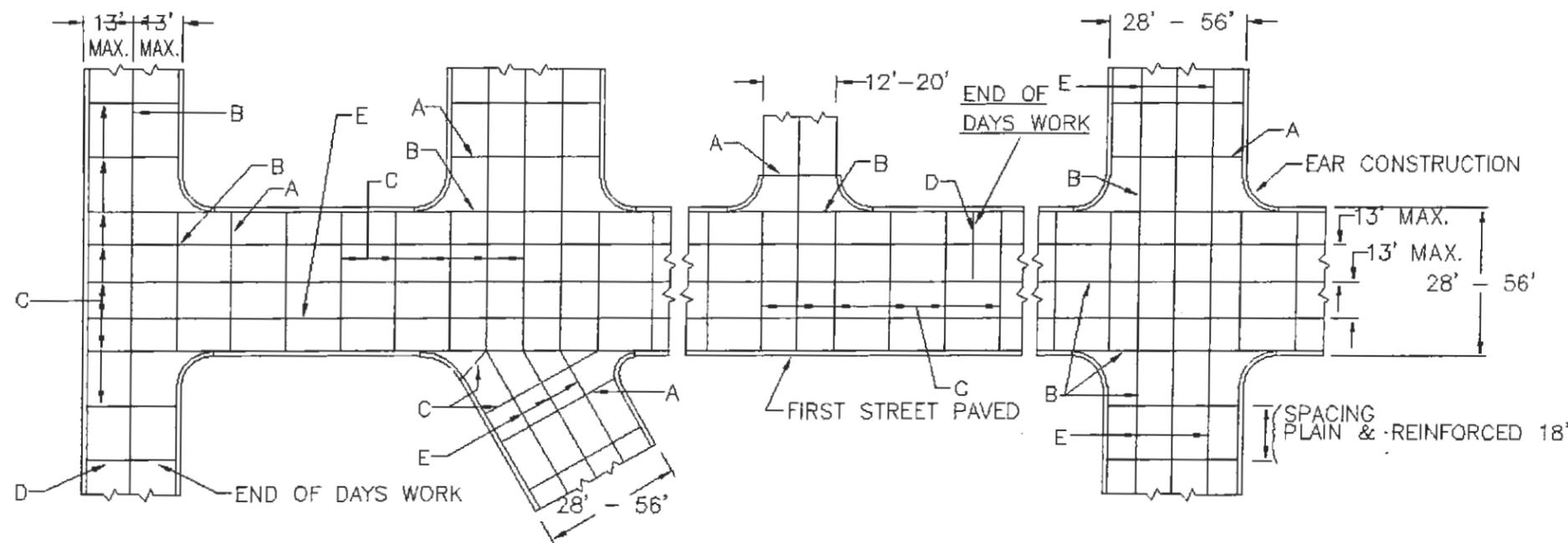


DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION
<input checked="" type="checkbox"/> CIVIL
<input type="checkbox"/> TRAFFIC
<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER
<input type="checkbox"/>

MINIMUM PAVEMENT
SECTION

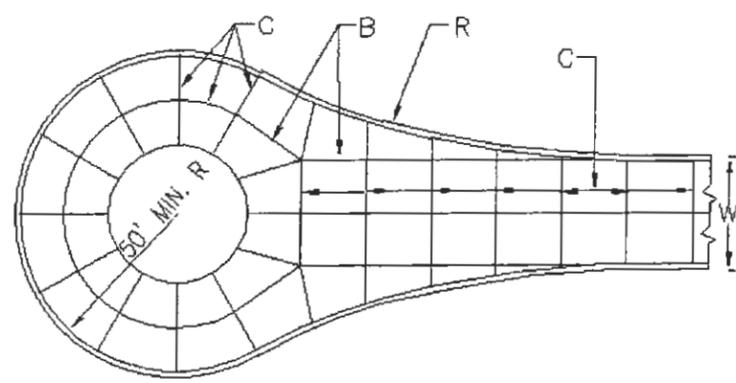
STANDARD DRAWING
SHEET NO.
SP-2



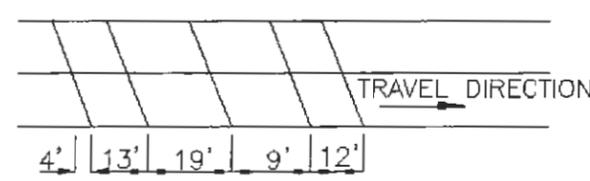
- A - EXPANSION JOINT WITH THICKENED EDGES OR EXPANSION JOINT WITH LOAD TRANSFER
- B - LONGITUDINAL CONSTRUCTION JOINT TO BE USED IN TYPE I PAVEMENT ONLY.
- C - TRANSVERSE JOINT
- D - TRANSVERSE CONSTRUCTION JOINT TO BE USED AT END OF DAYS WORK
- E - LONGITUDINAL JOINT TO BE USED AT ALL TIMES EXCEPT IN TYPE I PAVEMENT

NOTES:

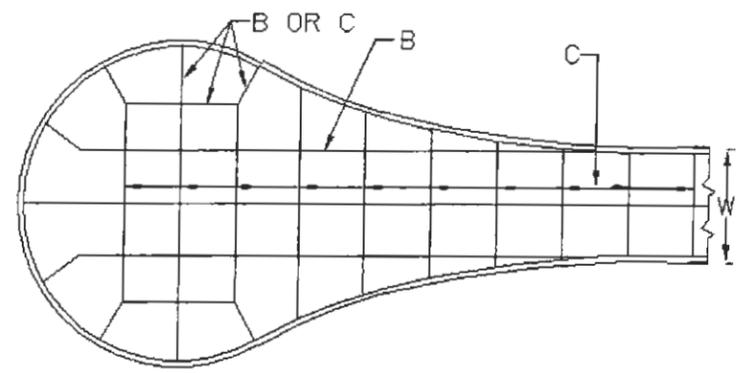
- 1 - MAXIMUM JOINT SPACING:
LONGITUDINAL - 13 FEET
TRANSVERSE - PLAIN AND REINFORCED 18 FEET
- 2 - SEE STANDARD DRAWINGS SP-4 & SP-4A FOR TYPES OF JOINTS
- 3 - SEE STANDARD DRAWINGS SG-1 & SG-2 FOR PAVEMENT WIDTHS



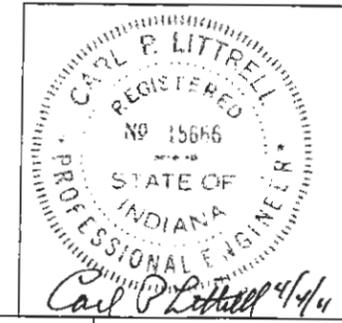
CUL DE SAC
OPEN CENTER



NOTE:
IF SPEED LIMIT IN EXCESS OF 35 M.P.H. TRANSVERSE JOINT SPACING TO BE RANDOMIZED AT INTERVALS OF 13-19-18-12 FT. (REPEAT) IN 24 FT. THIS APPLIES ONLY TO NON-REINFORCED PAVEMENT.



CUL DE SAC
FULLY PAVED



No.	BY	DATE	REVISION	DATE	7-19-89
1	D.M.	5/10/00		DRAWN	EJL
2	H.K.	3/23/01		CHECKED	TV
3	JRP	11/28/01	REVISED BORDER & TEXT SIZE	APRVD	CPL
				SCALE	NONE

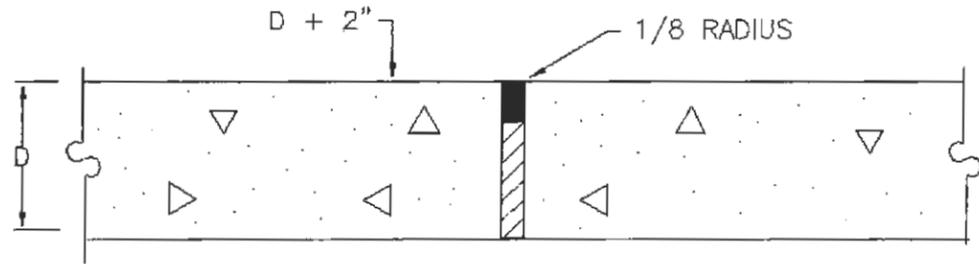


DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

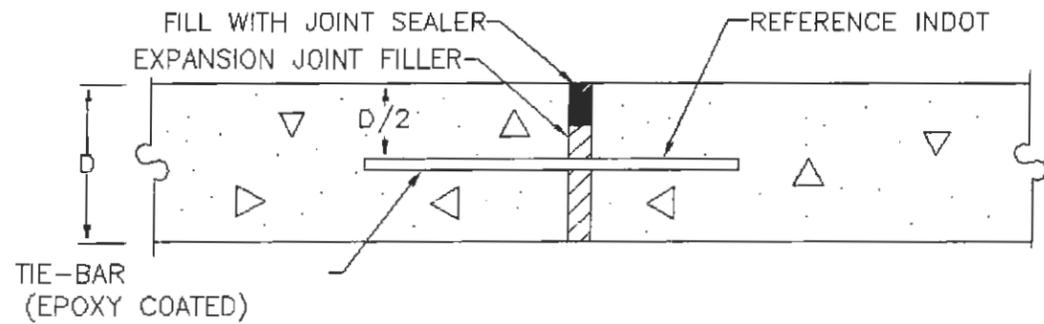
DIVISION
<input checked="" type="checkbox"/> CIVIL
<input type="checkbox"/> TRAFFIC
<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER

JOINT LOCATION
CONCRETE PAVEMENT

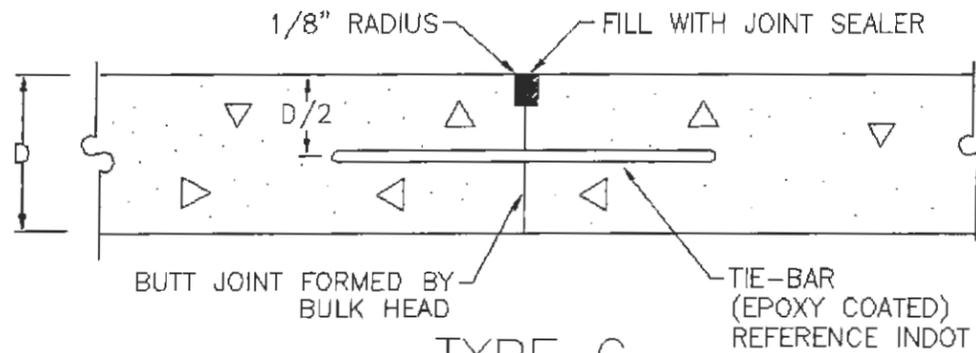
STANDARD DRAWING
SHEET NO.
SP-3



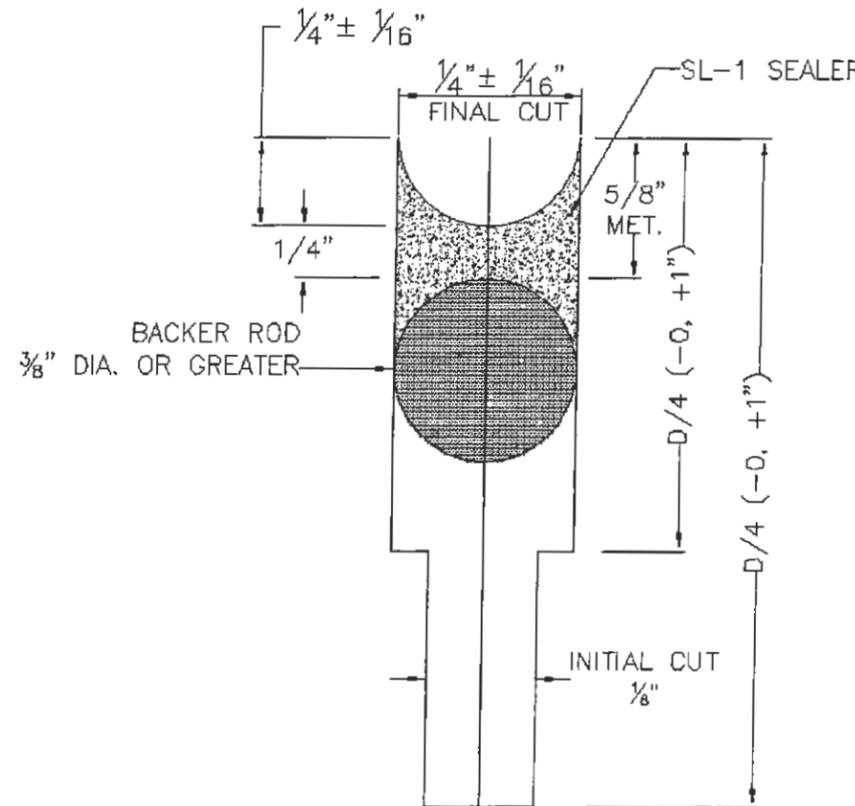
TYPE A
EXPANSION JOINT



TYPE A--ALTERNATE
EXPANSION JOINT



TYPE C
TRANSVERSE CONSTRUCTION JOINT



SILICONE JOINT SEALANT
REFERENCE INDOT

NOTES:

- 1 - TRANSVERSE JOINTS SHALL BE CONSTRUCTED PERPENDICULAR TO THE CENTERLINE WITH A MAXIMUM SPACING OF 18'-0" UNLESS OTHERWISE SPECIFIED.
- 2 - FOR TRANSVERSE CONSTRUCTION JOINTS, THE INITIAL SAW CUT MAY BE ELIMINATED.
- 3 - NO KEWAY IS TO BE USED ON ANY CONC. PAVEMENT REPLACEMENT.

TIE-BAR SIZES FOR LONGITUDINAL JOINT CONSTRUCTION		
PAVEMENT THICKNESS, D	TIE-BAR SIZE	SPACING
LESS THAN 9"	*5	3'-0" c/c
9" THROUGH 12"	*6	3'-0" c/c
GREATER THAN 12"	*6 OR *7	2'-0" c/c 3'-0" c/c



No.	BY	DATE	REVISION	DATE	8-10-89
1	D.M.	5/10/00		DRAWN	EJL
2	H.K.	3/23/01		CHECKED	TV
3	JRP	11/28/01	REVISED BORDER & TEXT SIZE	APRVD	CPL
				SCALE	NONE

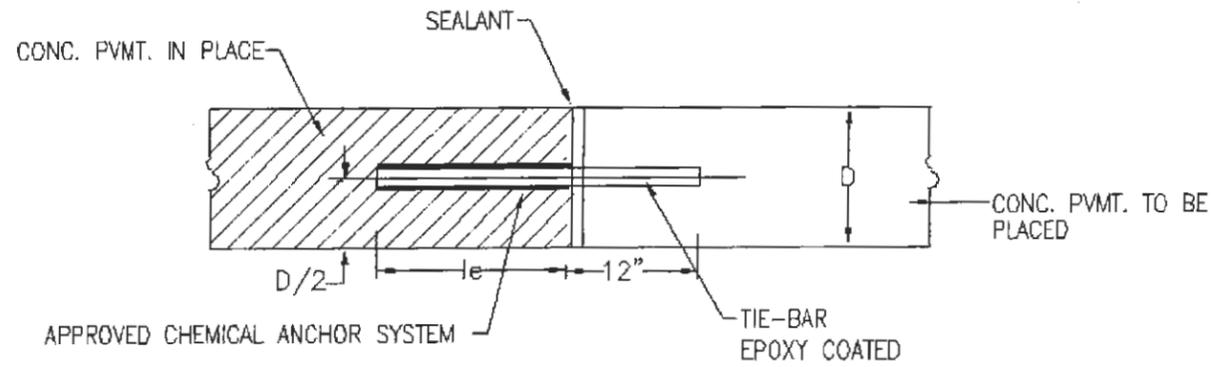


DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION	
<input checked="" type="checkbox"/>	CIVIL
<input type="checkbox"/>	TRAFFIC
<input type="checkbox"/>	WATER
<input type="checkbox"/>	WASTE WATER

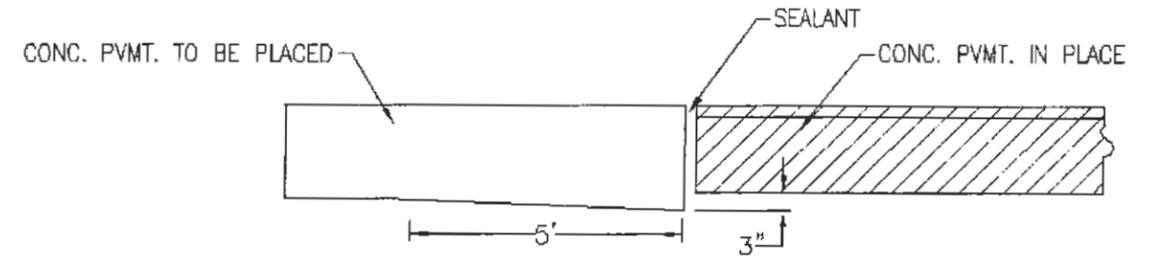
JOINTS
CONCRETE PAVEMENT

STANDARD DRAWING
SHEET NO.
SP-4



TYPE G

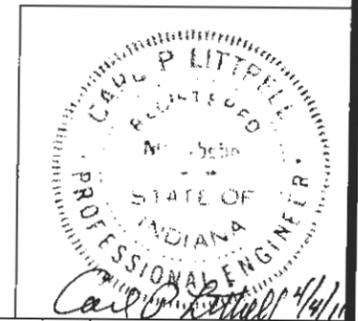
TRANSVERSE CONSTRUCTION JOINT
RETROFIT CONSTRUCTION TIE-BAR EMBEDMENT DETAIL



TYPE H

BUTT JOINT DETAIL

PAVEMENT THICKNESS, D	LONGITUDINAL CONSTRUCTION JOINT	
	TIE-BAR SIZE	MIN. LENGTH OF EMBEDMENT, le
LESS THAN 9"	*5	1'-0"
9" TO 12"	*7	1'-3"
GREATER THAN 12"	*8	1'-6"



No.	BY	DATE	REVISION	DATE	7-31-89
1	D.M.	5/10/00		DRAWN	EJL
2	H.K.	3/23/01		CHECKED	TV
3	JRP	11/28/01	REVISED BORDER & TEXT SIZE	APRVD	CPL
				SCALE	NONE



DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION
<input checked="" type="checkbox"/> CIVIL
<input type="checkbox"/> TRAFFIC
<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER

JOINTS
CONCRETE PAVEMENT

STANDARD DRAWING
SHEET NO.
SP-4A

BRICK PAVER PREPARATION:

1. REMOVE ORGANIC, UNSTABLE OR UNCONSOLIDATED MATERIAL FROM SITE, VERIFY CONFORMANCE OF SUBGRADE PREPARATION, COMPACTED DENSITY AND ELEVATIONS TO SPECIFIED REQUIREMENTS.

2. CLEAN AND RE-USE EXISTING STREET BRICK PAVERS REMOVED DURING SITE DEMOLITION REMAINING PAVERS NOT USED WILL BE RETURNED TO THE CITY.

BRICK PAVER PREPARATION:

1. SPREAD BEDDING SAND EVENLY OVER CRUSHED STONE BASE COURSE AND SCREED RAILS. (SCREED TO 1 INCH THICKNESS)
 a. DO NOT SPREAD BEDDING SAND BEYOND AREA TO BE COVERED BY PAVERS THE SAME DAY. PRIOR TO RECOMMENCEMENT OF WORK, REMOVE, REPLACE AND RE-SCREED BEDDING SAND NOT COVERED WITH PAVERS THE PREVIOUS WORK DAY.
 b. DO NOT DISTURB SCREEDED SAND. RE-SCREED DISTURBED BEDDING SAND.

2. LAY PAVERS BY HAND IN PATTERN(S) SHOWN OR EXISTING LAYOUT.
 a. LAY FULL PAVERS FIRST.
 b. MIX PAVERS FROM AT LEAST TWO PALLETS TO PRODUCE UNIFORM COLOR BLENDS.

3. PROVIDE $\frac{1}{8}$ INCH TO $\frac{3}{8}$ INCH WIDE JOINTS BETWEEN PAVERS. ADJUST PAVERS TO FORM STRAIGHT BOND LINES AND APPROPRIATE JOINT WIDTHS. MAXIMUM BOND LINE VARIATION SHALL BE \pm $\frac{1}{8}$ INCH OVER A 50 FOOT STRING LINE.

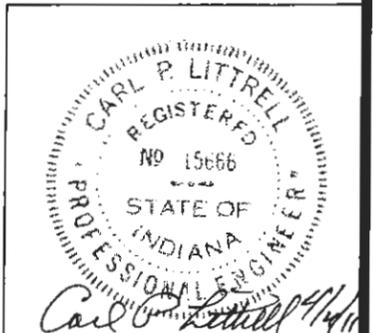
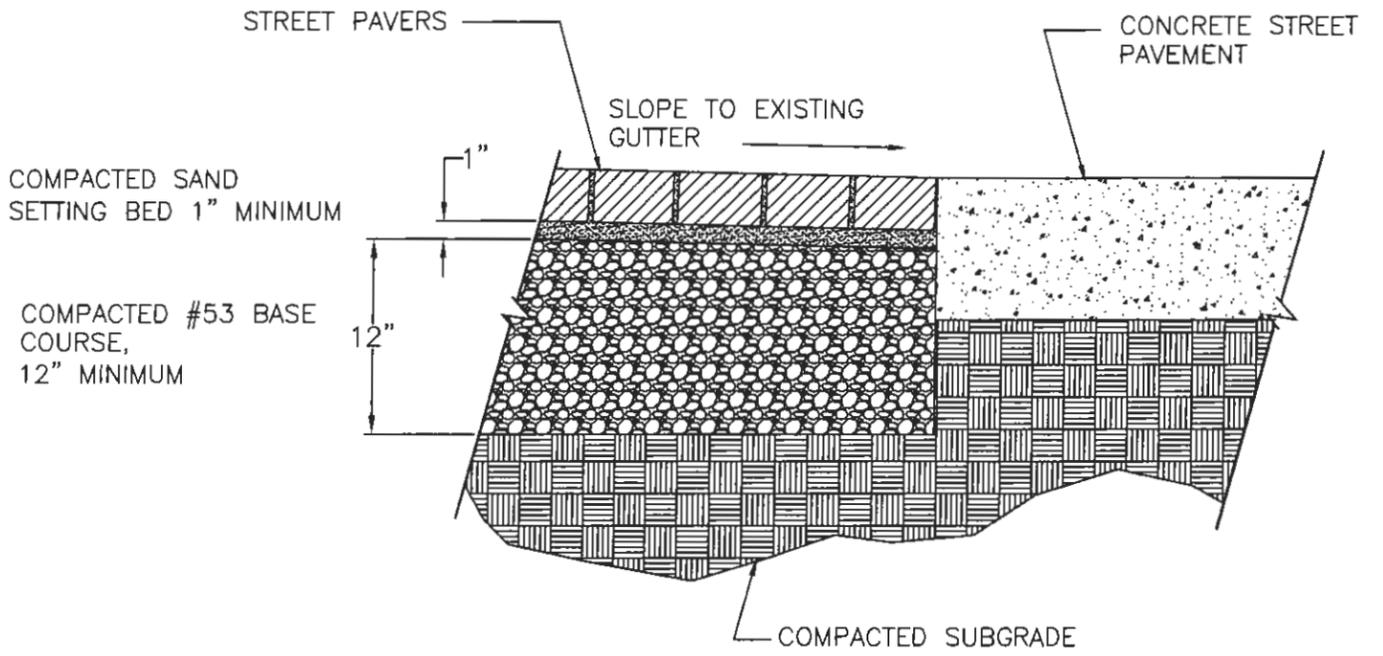
4. FILL GAPS AT PAVED AREA EDGES WITH CUT PAVERS.
 a. CUT PAVERS SHALL NOT BE SMALLER THAN $\frac{1}{3}$ (ONE-THIRD) OF A WHOLE PAVER EXCEPT WHERE PATTERN IS TO BE MAINTAINED AND A SMALLER PIECE ARE SURROUNDED BY A FULL PAVER AND CONCRETE BANDING.

5. DO NOT PERMIT TRAFFIC, INCLUDING CONSTRUCTION EQUIPMENT, ON PAVERS BEFORE INITIAL COMPACTION AND JOINT FILLING. DISTURBED AREAS OF PAVERS SHALL BE TAKEN UP, THE SAND RE-SCREEDED AND PAVERS RE-LAID.

6. VIBRATE PAVERS INTO SAND USING A HIGH FREQUENCY/LOW-AMPLITUDE PLATE COMPACTOR CAPABLE OF 3,000 lbf TO 5,000 lbf AT A 75 TO 100 Hz FREQUENCY. PROTECT PAVERS FROM CHIPPING DURING COMPACTION BY USING A RUBBER MATT, RUBBER ROLLERS OR OTHER APPROVED MATERIALS PLACED OVER PAVERS. DO NOT COMPACT WITHIN 6 FEET OF UNRESTRAINED EDGES. REMOVE CRACKED OR DAMAGED PAVERS AND REPLACE WITH NEW UNITS.

7. AFTER PAVERS ARE FULLY SETTLED AND FREE FROM MOVEMENT SIMULTANEOUSLY SPREAD, SWEEP AND COMPACT DRY JOINTING SAND INTO JOINTS UNTIL THEY ARE COMPLETELY FILLED AND SAND NO LONGER FALLS INTO JOINTS.

8. PROTECT AREAS NOT COVERED WITH CUT AND COMPACTIONED PAVERS WITH WATERPROOF COVERING OVERNIGHT.



No.	BY	DATE	REVISION	DATE
				3-23-2007
				DRAWN RSG
				CHECKED TV
				APRVD CPL
				SCALE
				NONE

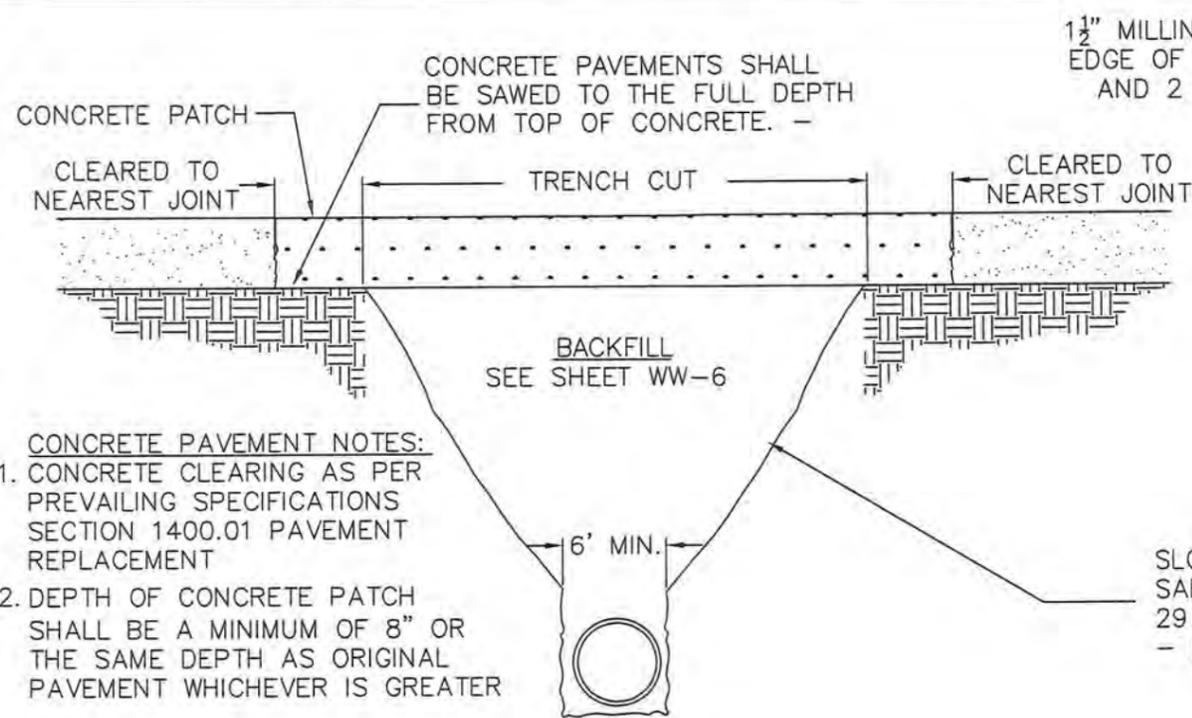


DEPARTMENT OF PUBLIC WORKS
 CITY OF SOUTH BEND, INDIANA

DIVISION
<input checked="" type="checkbox"/> CIVIL
<input type="checkbox"/> TRAFFIC
<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER
<input type="checkbox"/>

BRICK PAVERS
 REPLACEMENT

STANDARD
 DRAWING
 SHEET NO.
 SP-5

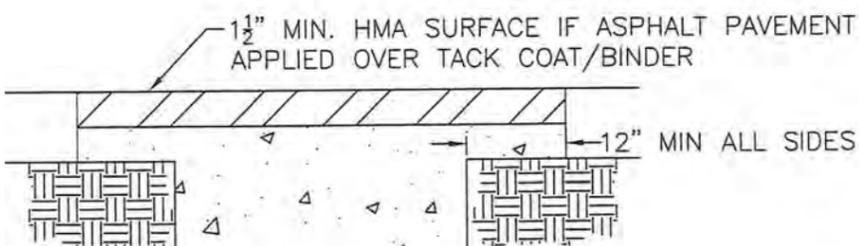
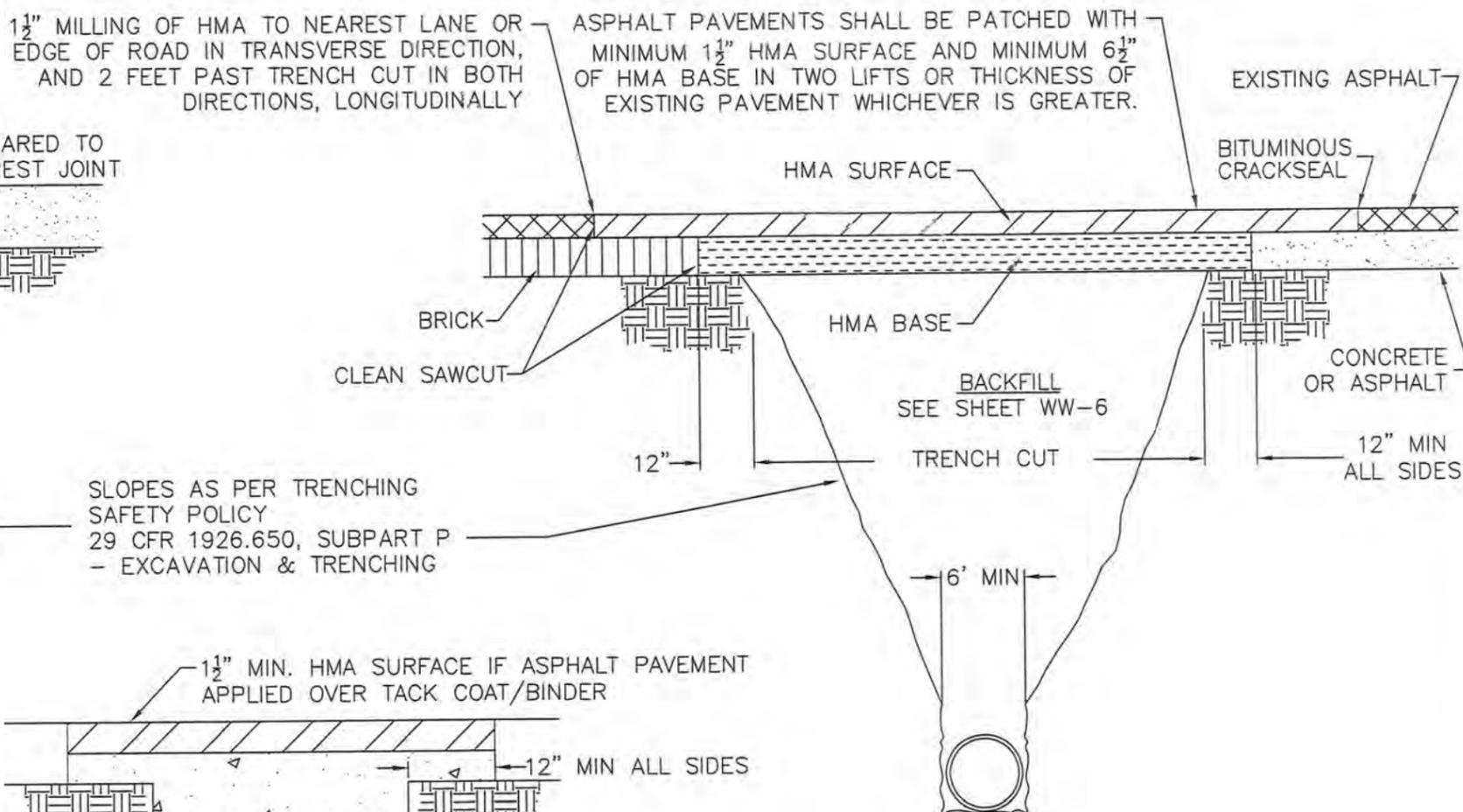


- CONCRETE PAVEMENT NOTES:**
1. CONCRETE CLEARING AS PER PREVAILING SPECIFICATIONS SECTION 1400.01 PAVEMENT REPLACEMENT
 2. DEPTH OF CONCRETE PATCH SHALL BE A MINIMUM OF 8" OR THE SAME DEPTH AS ORIGINAL PAVEMENT WHICHEVER IS GREATER

CONCRETE PAVEMENT
NOT TO SCALE

GENERAL NOTES:

1. TEMPORARY PATCH: IF IT IS NOT POSSIBLE, DUE TO WEATHER CONDITIONS, FOR THE CONTRACTOR TO REPLACE THE PAVEMENT WITHIN 24 HOURS FOLLOWING BACKFILLING OF CUT, A COARSE AGGREGATE BASE 8" THICK AND A COLD ASPHALTIC SURFACE OF 4" SHALL BE APPLIED AND MAINTAINED AS A TEMPORARY PATCH UNTIL PERMANENT REPAIRS CAN BE MADE. WHEN TEMPERATURE FALLS BELOW 50° WITHIN 72 HOUR CURE TIME, CONCRETE TO BE USED SHALL BE 7 BAG W/ 2% CALCIUM CHLORIDE. SUCH TEMPORARY PATCHES SHALL BE REPLACED WITH PERMANENT REPAIRS NO LATER THAN JUNE 1 OF THE FOLLOWING YEAR.
2. ALL UTILITIES MUST BE LOCATED PRIOR TO MAKING PAVEMENT CUT.



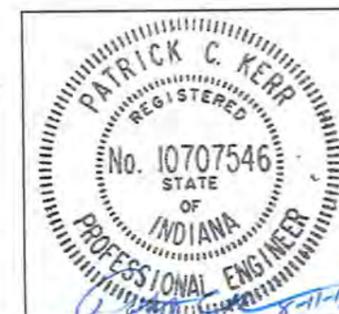
POT HOLING DETAIL
NOT TO SCALE

POT HOLING NOTES:

1. MAXIMUM POT HOLE DIAMETER OF 2 FEET, OTHERWISE, ASPHALT OR CONCRETE PAVEMENT CUT REPAIRS APPLY.

ASPHALT PAVEMENT NOTES:

1. DEPTH OF ASPHALT PATCH SHALL BE A MINIMUM OF 8" OR THE SAME DEPTH AS ORIGINAL PAVEMENT WHICHEVER IS GREATER
2. NO REINFORCING MESH BRICK PVMT. SHALL BE REPLACED WITH BRICK. USE ASPHALT PATCH.
3. WHEN EXCAVATING BRICK PAVEMENT, THE EXISTING BRICK SHALL BE REMOVED AND STOCKPILED, PRIOR TO EXCAVATION. SAID BRICK SHALL THEN BE USED FOR PAVEMENT REPLACEMENT.
4. A CONCRETE PATCH ON ASPHALT PVMT MAY BE ALLOWED BY THE CITY ENGINEER IF THE ROAD IS SCHEDULED TO BE REHABILITATED IN THE NEAR FUTURE OR OTHER LIKE CIRCUMSTANCES.



No.	BY	DATE	REVISION
1	DRW	2/93	
2	DM	5/10/00	
3	HK	3/23/01	
4	JRP	12/10/01	REVISED BORDER & TEXT SIZE
5	JRP	2/19/02	REVISED TRENCHING DETAIL
6	JRP	3/21/02	REVISED BACKFILL NOTE
7	PCK	8/11/15	SEPARATED PAVEMENT TYPES

DATE	7-21-89
DRAWN	EJL
CHECKED	TV
APRVD	CPL
SCALE	
NONE	

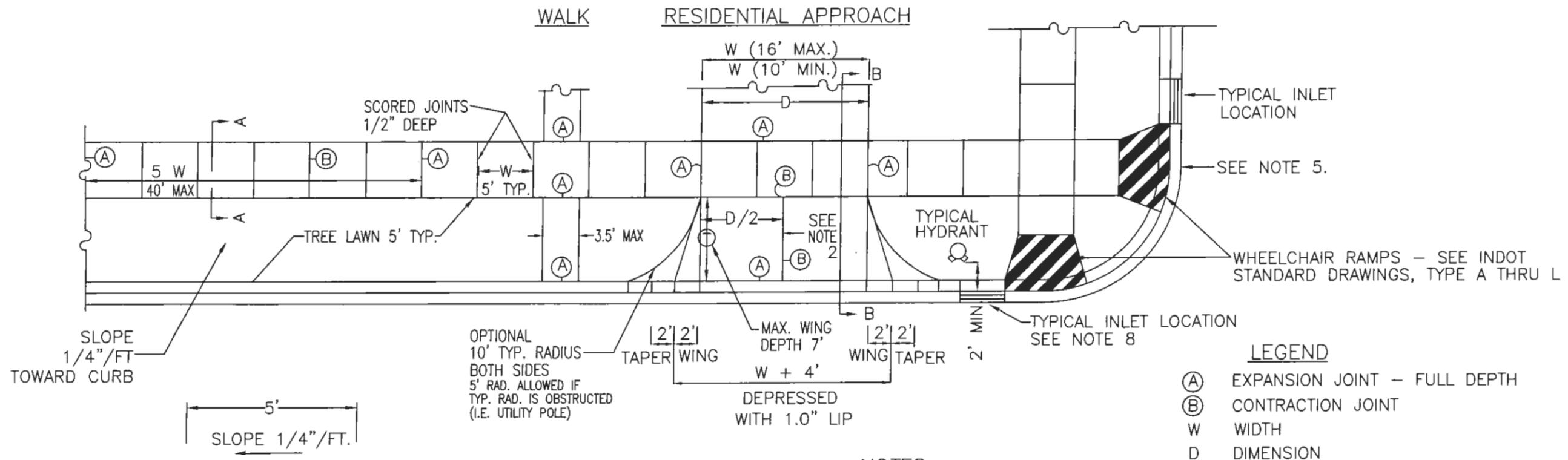


DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION
<input checked="" type="checkbox"/> CIVIL
<input type="checkbox"/> TRAFFIC
<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER

PAVEMENT
UTILITY CUT
REPAIRS

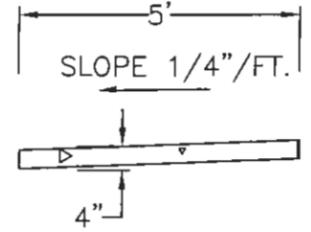
STANDARD
DRAWING
SHEET NO.
SR-1



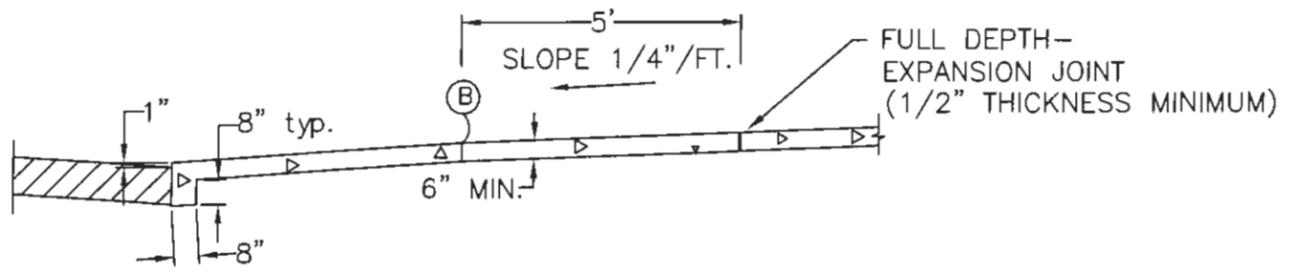
- LEGEND**
- (A) EXPANSION JOINT - FULL DEPTH
 - (B) CONTRACTION JOINT
 - W WIDTH
 - D DIMENSION

- NOTES:**
1. - CLASS "A" CONCRETE TO BE USED IN ALL WALKS AND APPROACHES
 2. - RADII AS SPECIFIED
 3. - CONTRACTION JOINT REQUIRED ON APPROACHES WHEN D IS 12 OR MORE FT.
 4. - SIDEWALK WHEELCHAIR RAMPS REQUIRED AS PER INDOT STANDARD DRAWINGS,
 5. - "CURING CONCRETE" - AS PER INDOT STANDARD SPECIFICATIONS SECTION 501 (PARAGRAPH 501.20) USE A CURING COMPOUND IMMEDIATELY (WHITE MEMBRANE ONLY ACCEPTED CURE)
 6. - CONCRETE FORMS SHALL BE AT LEAST AS HIGH AS THE THICKNESS OF THE ITEM SHOWN. LUMBER OF NOMINAL DIMENSION SHALL NOT BE USED TO EQUAL THE SPECIFIED DIMENSION.
 7. - ALL WALKS & APPROACHES SHALL REQUIRE PROPER COMPACTION AS PER INDOT STANDARD SPECIFICATIONS SECTION 20 (PARAGRAPHS 207.02 & 207.05)
 8. - CURB CASTING - EXPANSION JOINT MATERIAL AS PER INDOT SPECIFICATION 605.04 (e) TO BE PLACED ON EITHER SIDE.
 9. - BLANKETS SHALL BE UTILIZED ON CONCRETE WHEN TEMPERATURE IS EXPECTED FALL BELOW 50°.
 10. - NO WIRE MESH OR REBAR ALLOWED IN ANY CONCRETE (SIDEWALK, APPROACHES, CURBS) PLACED WITHIN THE RIGHT OF WAY.

RESIDENTIAL SIDEWALK SECTION A-A



RESIDENTIAL APPROACH SECTION B-B



9	RSG	1/18/11	EDIT WINGS & TAPER	9	RSG	9/30/09	REVISED DIM. & NOTES
8	JRP	3/20/02	EDIT DIMENSION OF DRIVEWAY LIP				
7	JRP	2/19/02	EDIT NOTE 6 & 8, REVISE SECTION B-B				
6	JRP	12/13/01	REVISED BORDER & TEXT SIZE				
No.	BY	DATE	REVISION	DATE	7-21-89		
5	HK	3/23/01		DRAWN	EJL		
4	DM	8/13/99		CHECKED	TV		
3	DM	11/20/98		APRVD	CPL		
2	DM	6/9/98			SCALE		
1	DRW	2/93			NONE		

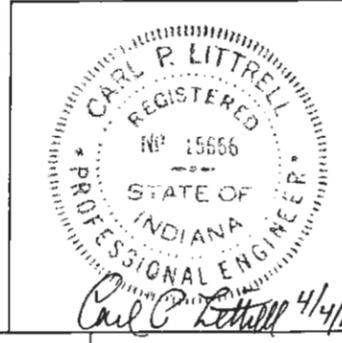


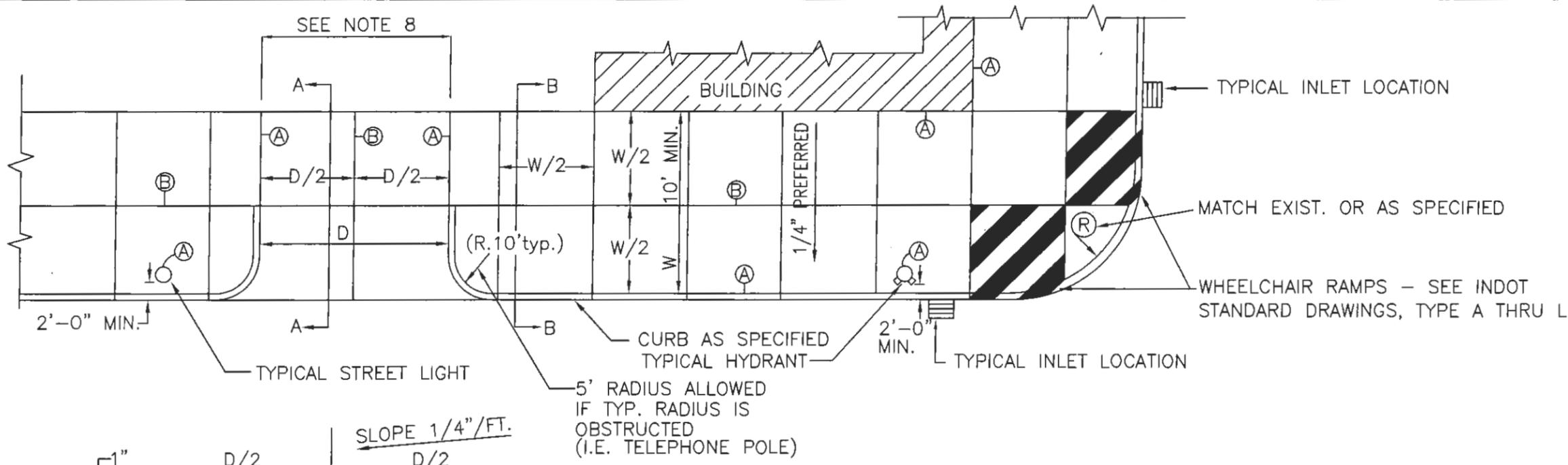
DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION	
<input checked="" type="checkbox"/>	CIVIL
<input type="checkbox"/>	TRAFFIC
<input type="checkbox"/>	WATER
<input type="checkbox"/>	WASTE WATER

RESIDENTIAL SIDEWALK
& APPROACH

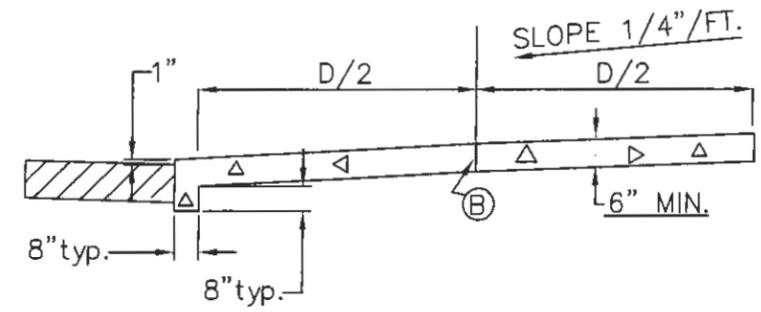
STANDARD DRAWING
SHEET NO.
SW-1



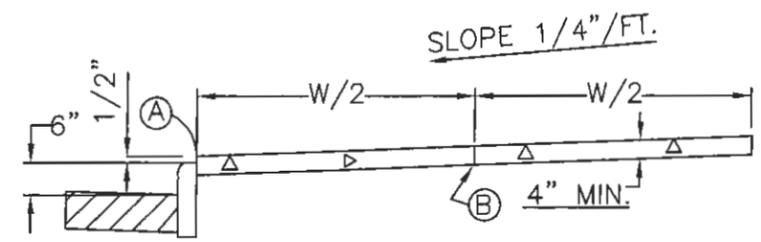


LEGEND

(A) EXPANSION JOINT - FULL DEPTH
 (B) CONTRACTION JOINT
 W - WIDTH (16' MIN.)
 D - SEE NOTE 8



BUSINESS APPROACH
SECTION A - A

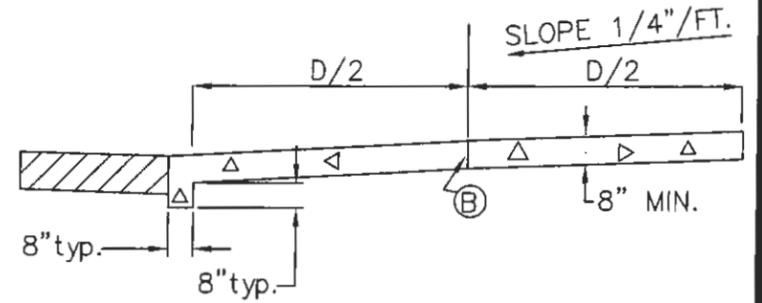


TYPICAL SIDEWALK AT CURB
SECTION B - B

5' RADIUS ALLOWED
IF TYP. RADIUS IS
OBSTRUCTED
(I.E. TELEPHONE POLE)

NOTES:

1. - CLASS "A" CONCRETE TO BE USED IN ALL WALKS AND APPROACHES
2. - RADII AS SPECIFIED.
3. - SIDEWALK WHEELCHAIR RAMPS REQUIRED AS PER INDOT STANDARD DRAWINGS, RAMPS ARE TO BE FLUSH W/ EXISTING PAVEMENT
4. - UTILITY POLES, HYDRANTS, ETC. MUST BE WRAPPED WITH 1/2" EXPANSION MATERIAL PRIOR TO CONCRETE POUR.
5. - CONTRACTION JOINT REQUIRED ON APPROACHES WHEN D IS 12 OR MORE FT.
6. - "CURING CONCRETE" - AS PER INDOT STANDARD SPECIFICATIONS SECTION 501 (PARAGRAPH 501.20) USE A CURING COMPOUND IMMEDIATELY (WHITE MEMBRANE ONLY ACCEPTED CURE)
7. - CONCRETE FORMS SHALL BE AT LEAST AS HIGH AS THE THICKNESS OF THE ITEM SHOWN. LUMBER OF NOMINAL DIMENSIONS SHALL NOT BE USED TO EQUAL THE SPECIFIED DIMENSION.
8. - ALL WALKS & APPROACHES SHALL REQUIRE PROPER COMPACTION- AS PER INDOT STANDARD SPECIFICATIONS SECTION 207 (PARAGRAPHS 207.02 & 207.05)
 A. - INDUSTRIAL APPROACH- 30' MAX. @ THROAT, 40' MAX RADIUS
 B. - BUSINESS APPROACH - 24' MAX. @ THROAT, 20' MAX RADIUS
9. - BLANKETS SHALL BE UTILIZED ON CONCRETE WHEN TEMPERATURE IS EXPECTED FALL BELOW 50°.



INDUSTRIAL APPROACH
SECTION A - A

No.	BY	DATE	REVISION
8	RSG	1/18/11	REVISED DETAILS AND NOTES
7	JRP	3/20/02	ADDED NOTE #9
6	JRP	12/13/01	REVISE DETAILS, EDIT NOTE #7, OMIT NOTE 8
5	JRP	12/13/01	REVISED BORDER & TEXT SIZE
4	HK	3/23/01	
3	DM	8/13/99	
2	DM	6/9/98	
1	DRW	2/93	

DATE	7-31-89
DRAWN	EJL
CHECKED	TV
APRVD	CPL
SCALE	
	NONE

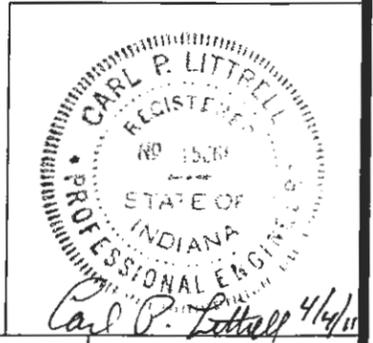


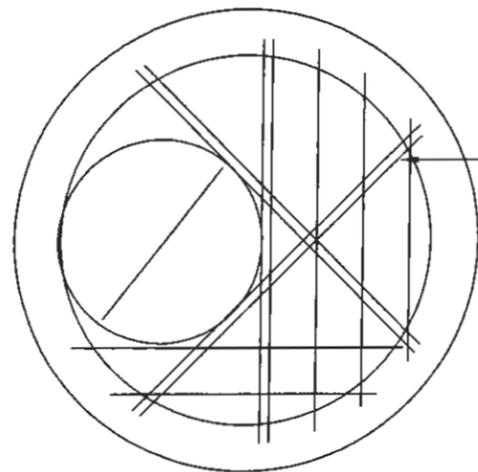
DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION	
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<input type="checkbox"/>	TRAFFIC
<input type="checkbox"/>	WATER
<input type="checkbox"/>	WASTE WATER

BUSINESS AREA SIDEWALK
& APPROACH

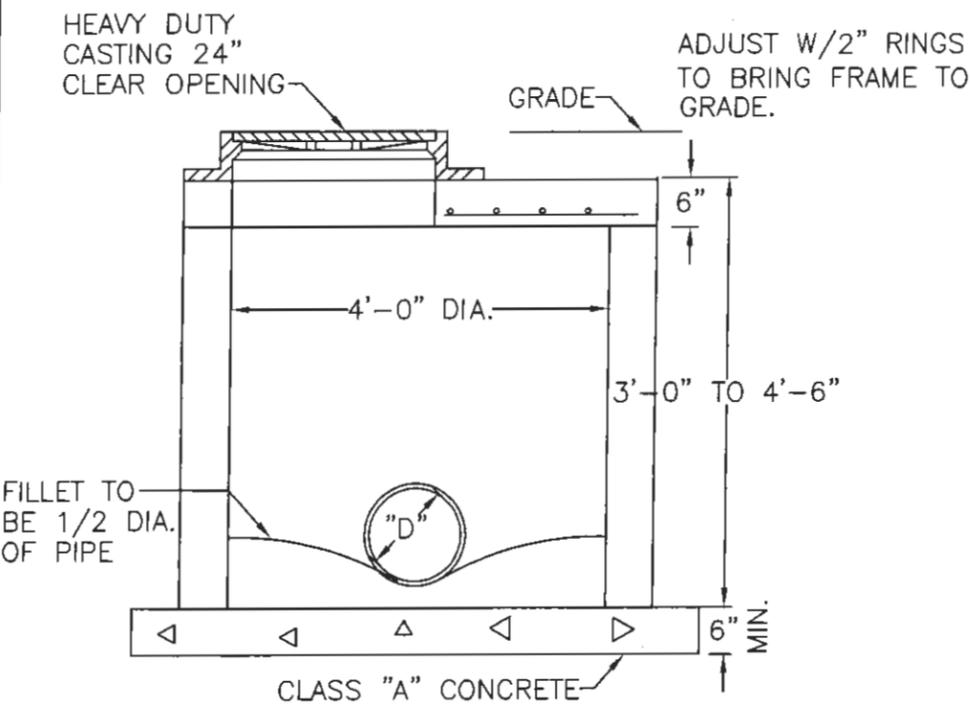
STANDARD DRAWING	
SHEET NO.	SW-2



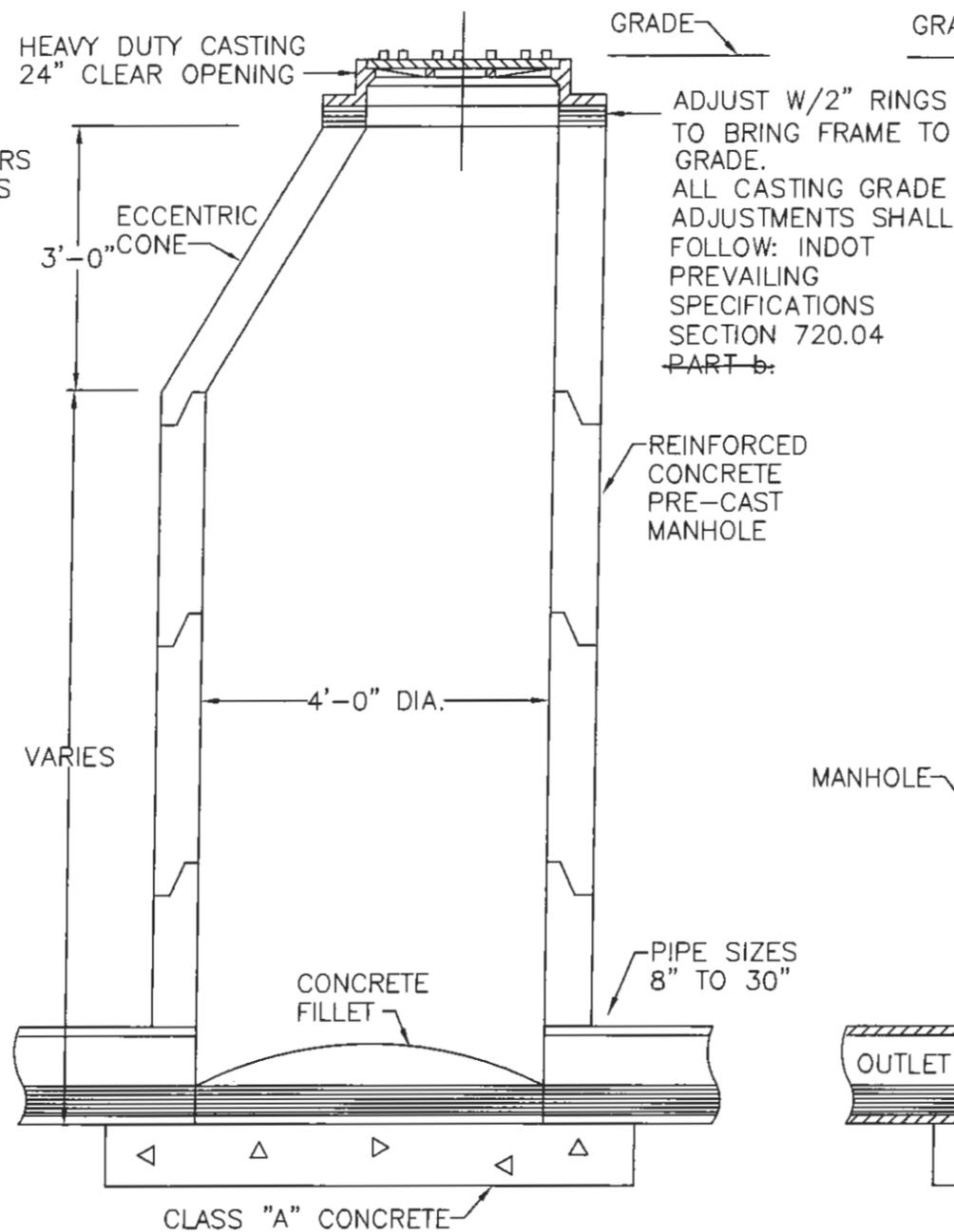


PLAN SLAB REINFORCING

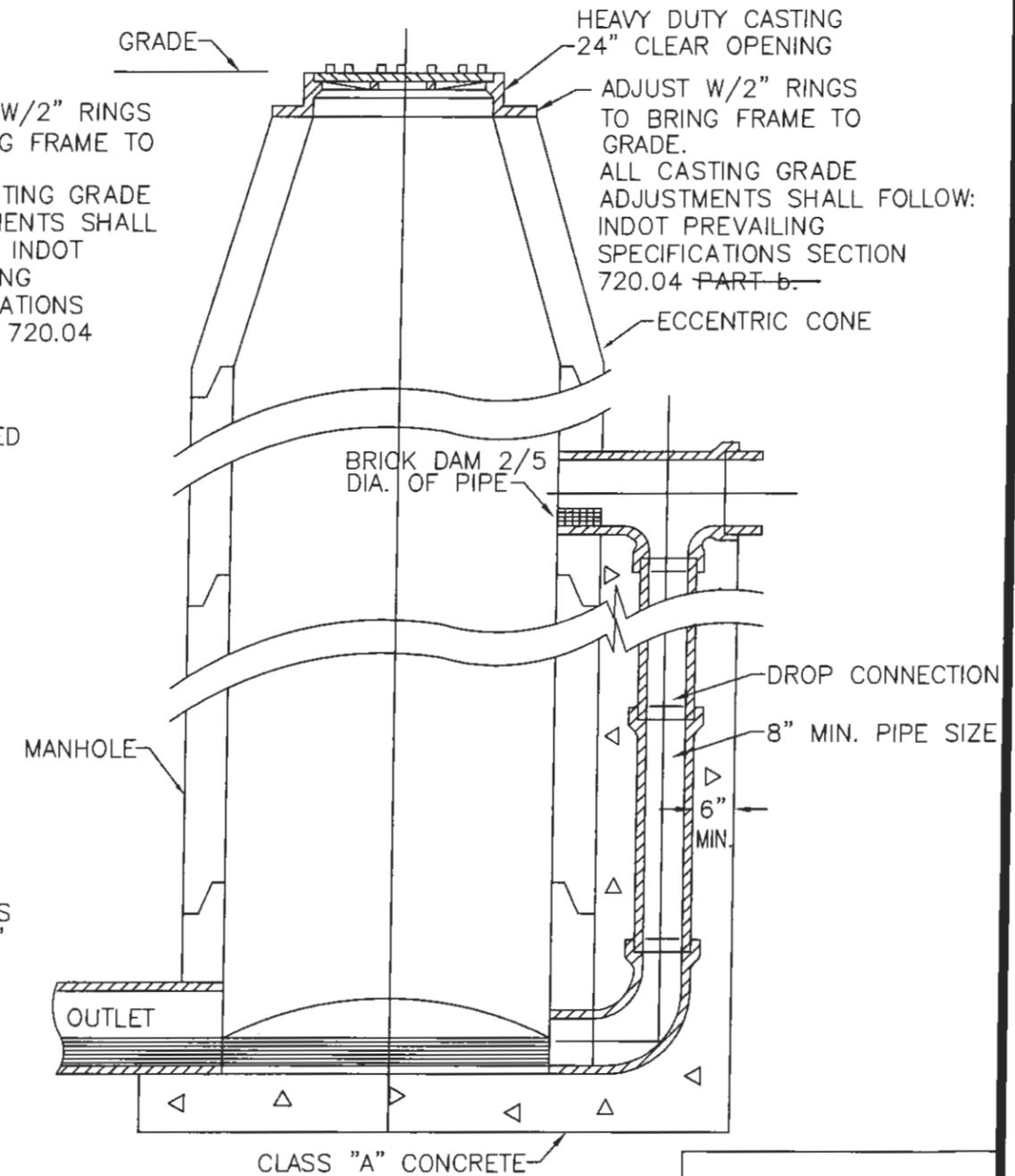
SLAB REINF. #4 BARS
6" O.C. EXTRA BARS
AROUND OPENING



STANDARD SHALLOW MANHOLE



STANDARD PRE-CAST MANHOLE



STANDARD DROP MANHOLE

NOTES

- 1.) ALL MANHOLES SHALL BE MANUFACTURED AND INSTALLED IN COMPLIANCE WITH ASTM C-478.
- 2.) ALL PIPE CONNECTIONS SHALL BE MADE WITH INTEGRAL RESILIENT FITTINGS COMPLYING WITH ASTM C-923. (30" OR LESS)
- 3.) COMPLETED MANHOLES SHALL BE TESTED WITH NEGATIVE AIR PRESSURE (VACUUM) IN ACCORDANCE WITH ASTM C-1244-93.



No.	BY	DATE	REVISION	DATE	8-1-89
1	DRW	2/93		DRAWN	EJL
2	DM	5/10/01		CHECKED	TV
3	HK	3/23/01		APRVD	CPL
4	JRP	12/13/01	REVISED BORDER & TEXT SIZE		SCALE
5	RSG	1/18/11	REVISED NOTES		NONE



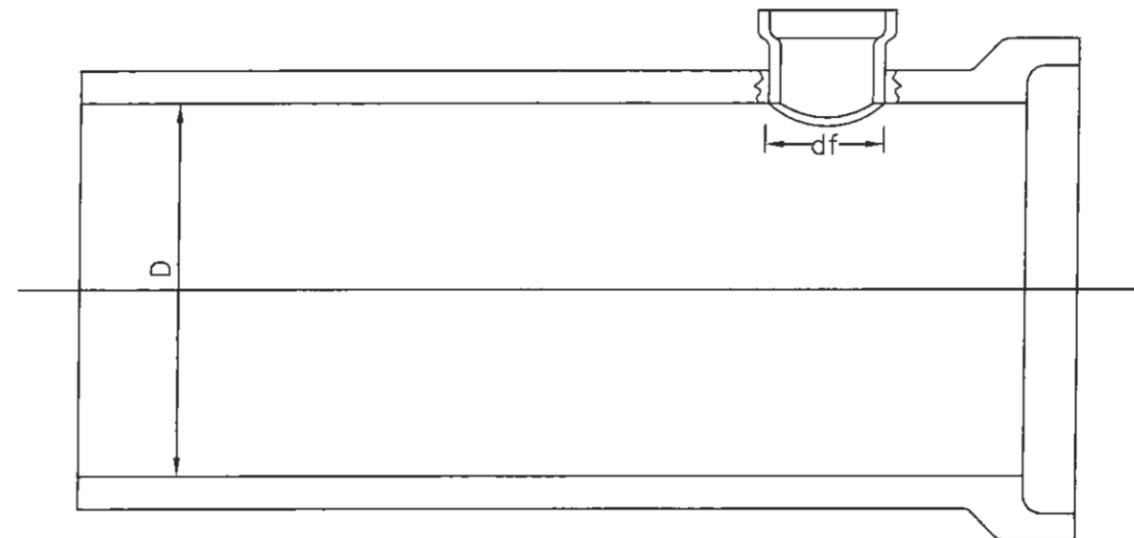
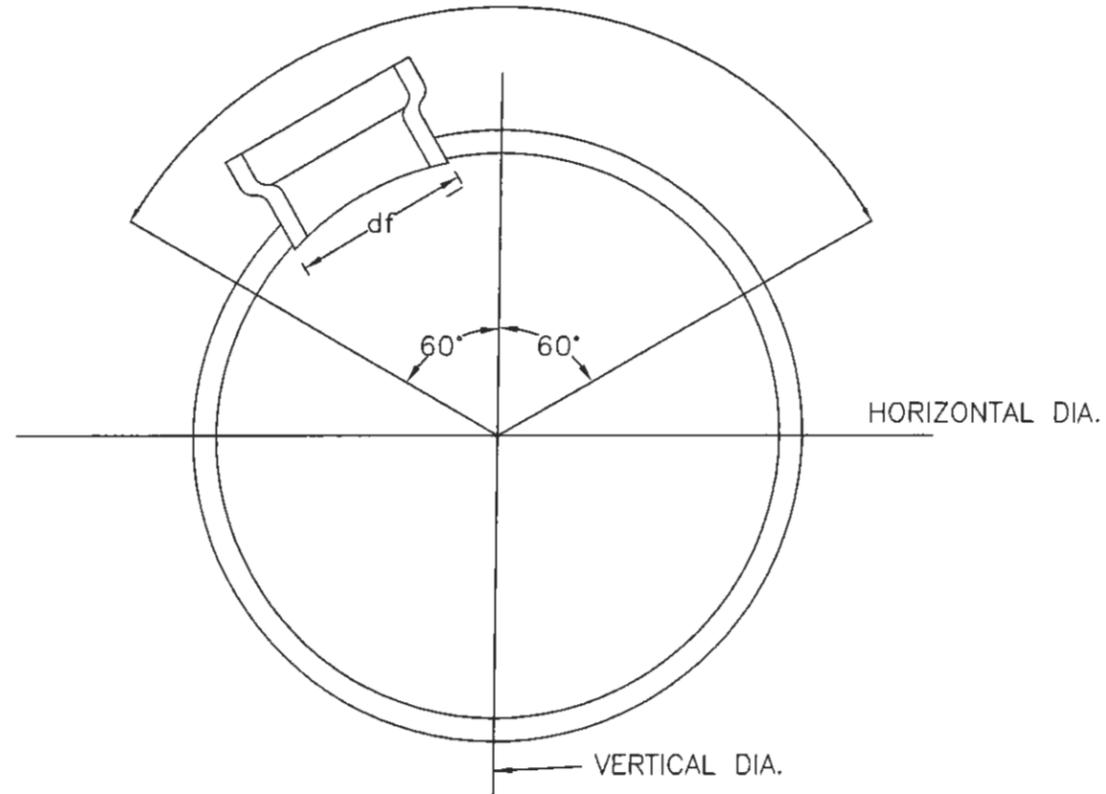
DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION	
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<input type="checkbox"/>	TRAFFIC
<input type="checkbox"/>	WATER
<input type="checkbox"/>	WASTE WATER

MANHOLES
(STORM AND SANITARY)

STANDARD DRAWING
SHEET NO.
WW-1

TAPPING AREA 120°



NOTE:

When $df > 1/3 D$ use Wye or Manhole
 When $df \leq 1/3 D$ use Manufactured Saddle or
 if not available cut tap pipe per sketch.



No.	BY	DATE	REVISION	DATE	8-1-89
1	D.M.	5/10/00		DRAWN	EJL
2	H.K.	5/10/01		CHECKED	TV
3	JRP	12/10/01	REVISED BORDER & TEXT SIZE	APRVD	CPL
4	RSG	1/18/11	REVISED NOTES, LABEL		SCALE NONE

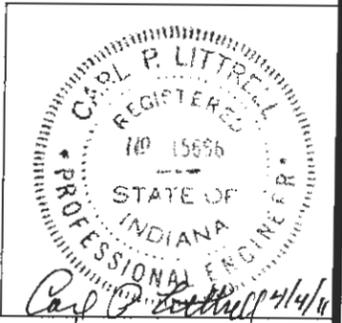
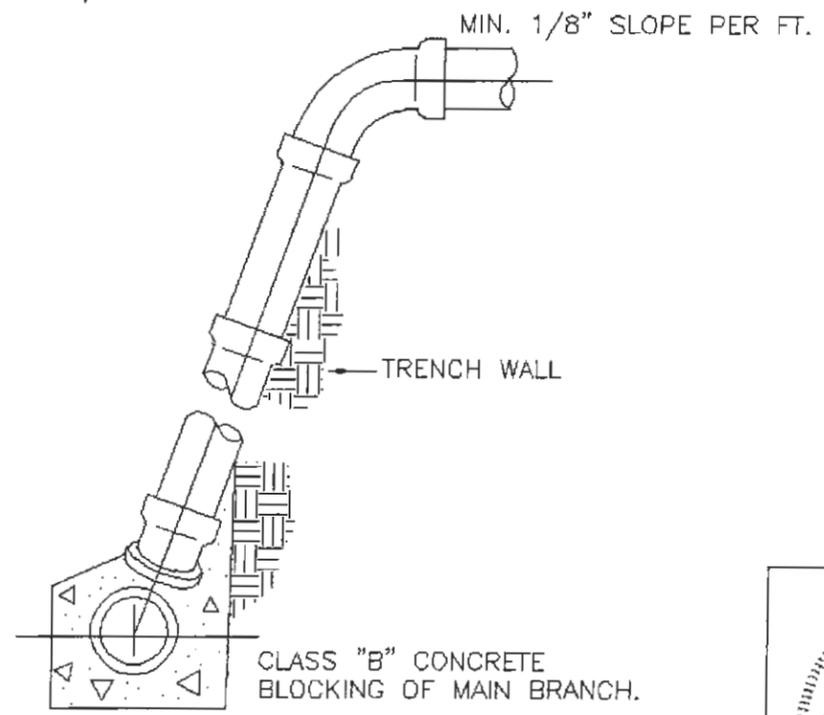
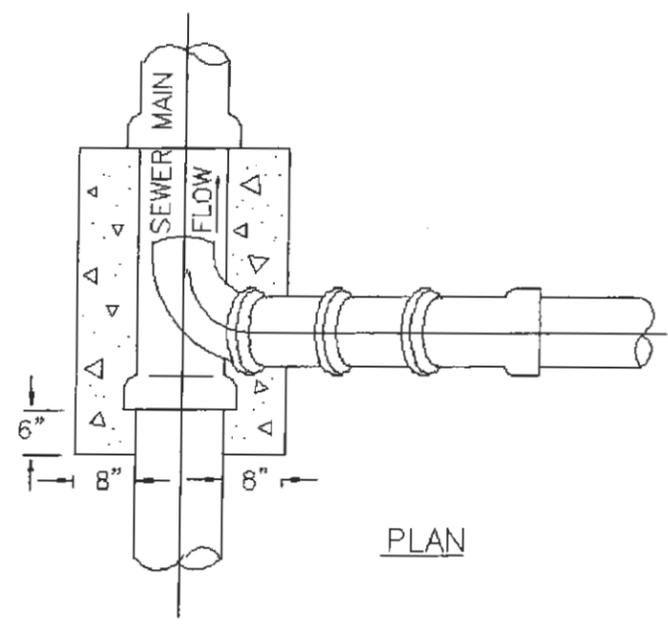
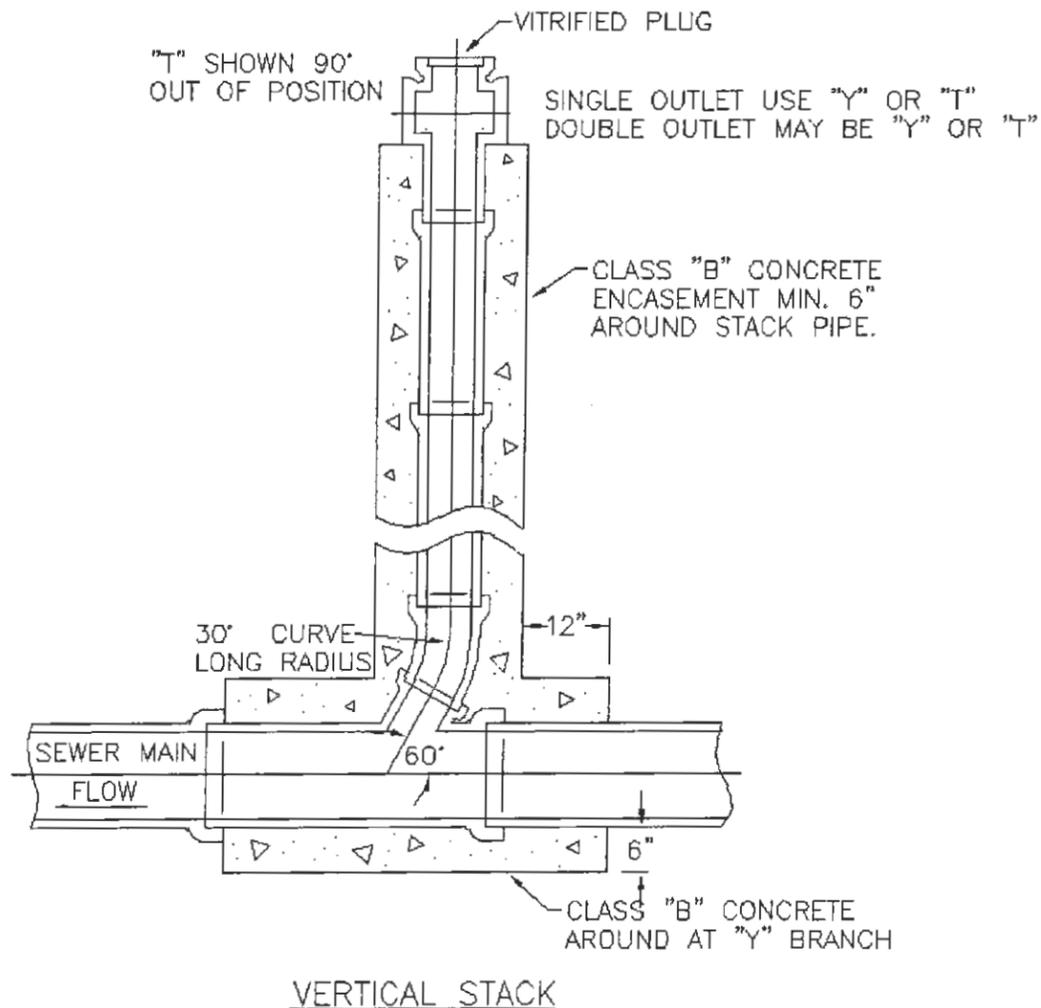


DEPARTMENT OF PUBLIC WORKS
 CITY OF SOUTH BEND, INDIANA

DIVISION	
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<input type="checkbox"/>	TRAFFIC
<input type="checkbox"/>	WATER
<input type="checkbox"/>	WASTE WATER
<input type="checkbox"/>	

SEWER TAPING
 STANDARD

STANDARD
 DRAWING
 SHEET NO.
 WW-2



No.	BY	DATE	REVISION	DATE	8-2-89
1	D.M.	5/10/00		DRAWN	EJL
2	H.K.	3/23/01		CHECKED	TV
3	JRP	12/10/01	REVISED BORDER & TEXT SIZE	APRVD	CPL
				SCALE	NONE



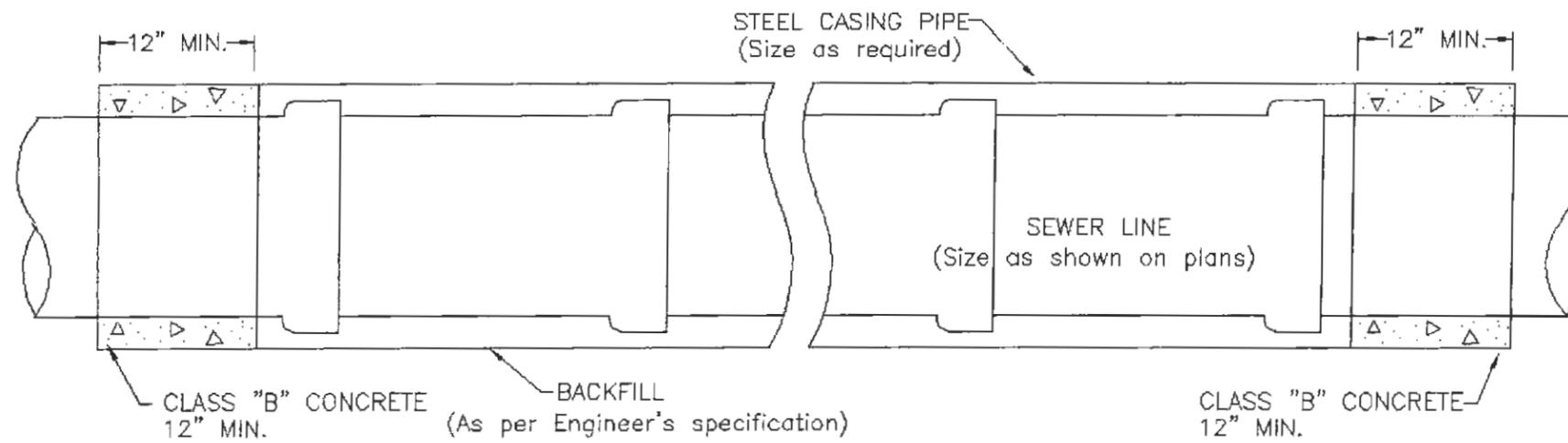
DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION
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<input type="checkbox"/> TRAFFIC
<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER

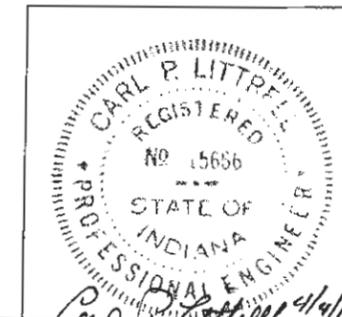
VERTICAL AND
SLANT STACKS

STANDARD
DRAWING

SHEET NO.
WW-3



TYPICAL ENCASING DETAIL
(Or as required by Railroad or Highway Dept.)



No.	BY	DATE	REVISION	DATE	8-1-89
1	D.M.	5/10/00		DRAWN	EJL
2	H.K.	3/23/01		CHECKED	TV
3	JRP	12/10/01	REVISED BORDER & TEXT SIZE	APRVD	CPL
				SCALE	NONE

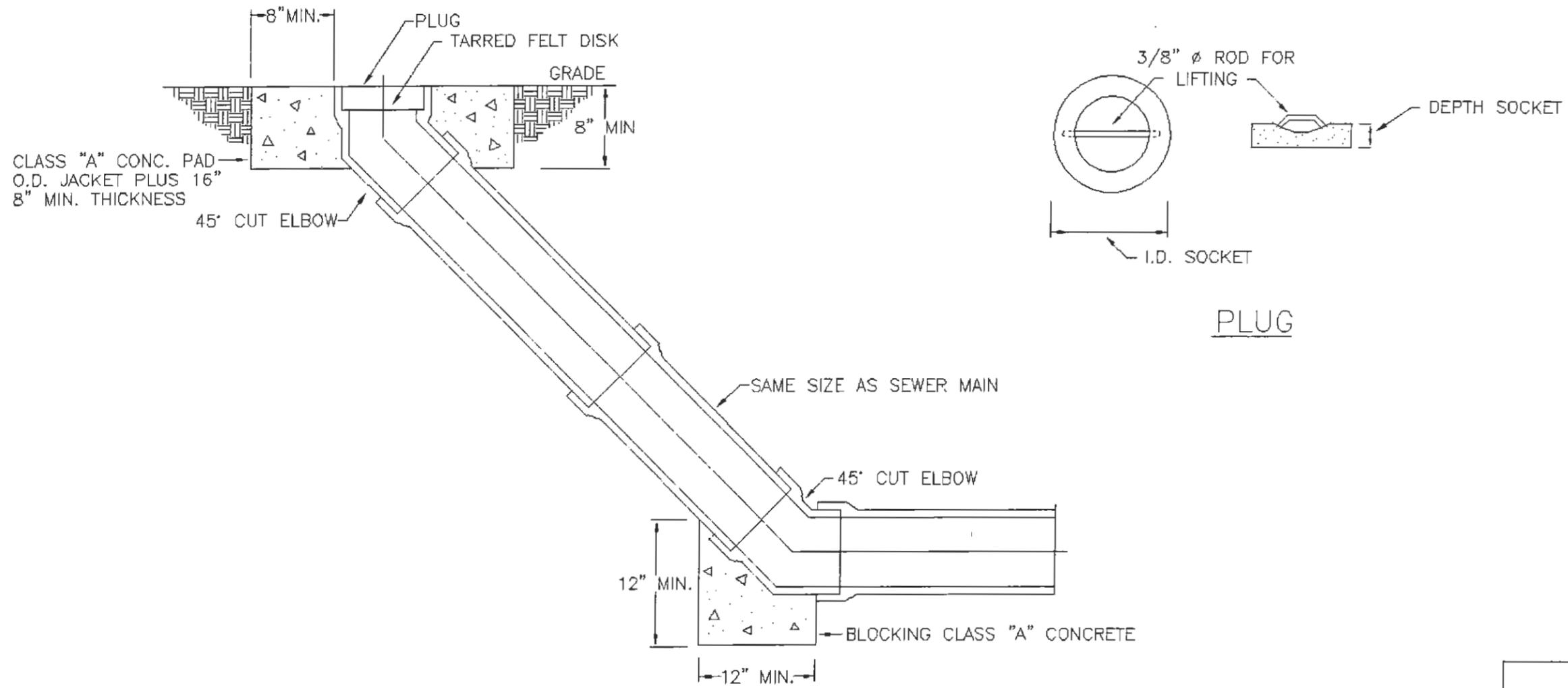


DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

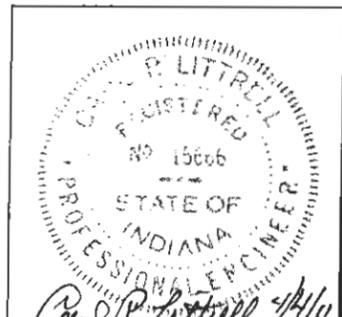
DIVISION	
<input checked="" type="checkbox"/>	CIVIL
<input type="checkbox"/>	TRAFFIC
<input type="checkbox"/>	WATER
<input type="checkbox"/>	WASTE WATER
<input type="checkbox"/>	

ENCASED
PIPE

STANDARD
DRAWING
SHEET NO.
WW-4



DETAIL TYPICAL CLEAN-OUT.



No.	BY	DATE	REVISION	DATE	8-3-89
1	D.M.	5/10/00		DRAWN	EJL
2	H.K.	3/23/01		CHECKED	TV
3	JRP	12/10/01	REVISED BORDER & TEXT SIZE	APRVD	CPL
				SCALE	NONE

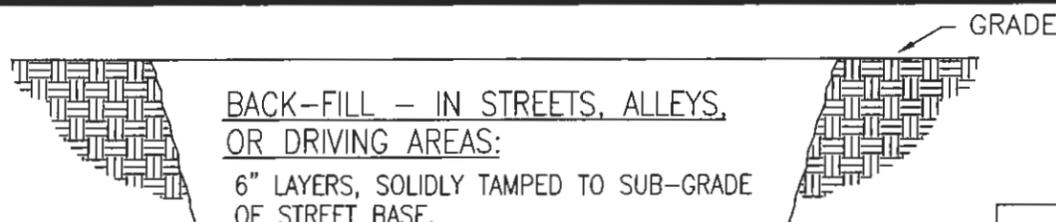


DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION
<input checked="" type="checkbox"/> CIVIL
<input type="checkbox"/> TRAFFIC
<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER

TYPICAL
CLEAN-OUT

STANDARD
DRAWING
SHEET NO.
WW-5



BACK-FILL - IN STREETS, ALLEYS, OR DRIVING AREAS:

6" LAYERS, SOLIDLY TAMPED TO SUB-GRADE OF STREET BASE.

BACK FILL SHALL BE COMPACTED TO 100% STANDARD PROCTOR

BACK-FILL - IN EASEMENT OR OPEN AREAS:

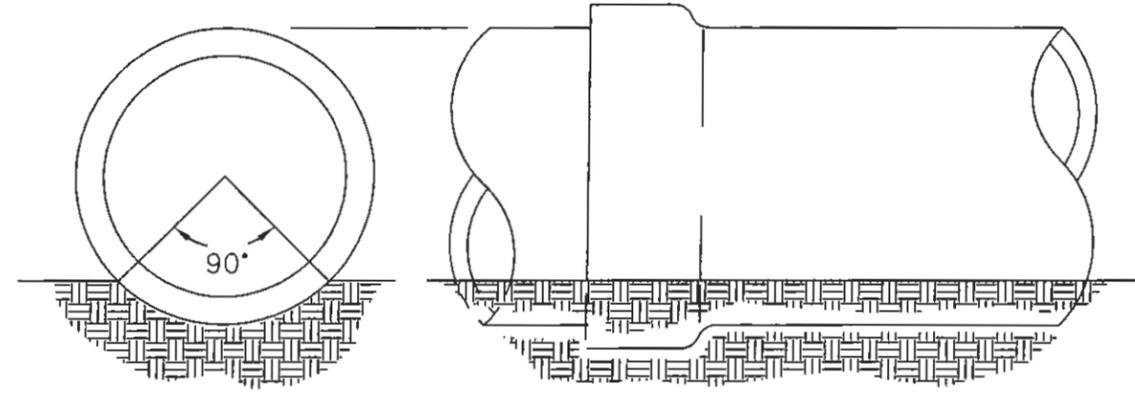
18" LAYERS SOLIDLY TAMPED.

COMPACTION NOT REQUIRED IF USING FLOWABLE FILL (INDOT SPEC.)

GRADE

ALLOWABLE MAXIMUM WIDTH OF TRENCH AT TOP OF PIPE

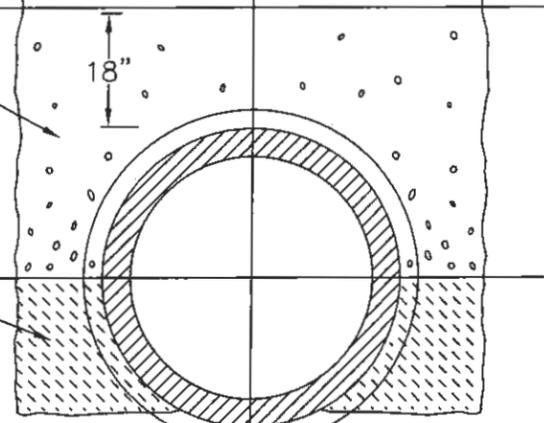
PIPE DIAM.	"W"
6"	18"
8"	24"
10"	24"
12"	30"
15"	35"
18"	39"
21"	42"
24"	45"
27"	48"
30"	53"
36"	68"
42"	75"
48"	82"



THE LOWER 90° ARC OF THE BARREL OF THE PIPE SHOULD BE IN FIRM CONTACT WITH UNDISTURBED EARTH. THE BEDDING SHALL BE CONTINUOUS AND UNIFORM FOR THE LENGTH OF THE PIPE.

SMALL EXCAVATIONS SHOULD BE MADE FOR THE BELLS. THESE SHOULD BE NO LARGER THAN NECESSARY TO CLEAR THE BELL.

MAXIMUM WIDTH "W"



MECHANICALLY BACK FILL AND COMPACT IN LAYERS NOT EXCEEDING 6".

MECHANICALLY TAMPED IN 4" LAYERS USING SUITABLE EXCAVATION MATERIAL

AN ALLOWABLE "W" OF 30" WILL BE PERMITTED WHERE DEPTH OF CUT EXCEEDS 12 FT. AND EXTRA STRENGTH PIPE IS SPECIFIED.

RIGID PIPE

PIPE SHALL BE BEDDED FIRMLY ON UNDISTURBED GROUND. EXCAVATE FOR BELLS. NO WEIGHT SHALL BE SUPPORTED BY THE BELLS.

FLEXIBLE PIPE

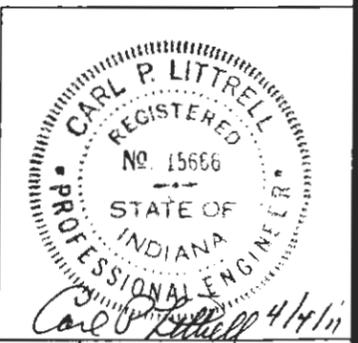
PIPE SHALL BE BEDDED ON A MINIMUM OF 4" OF CLASS I, II OR III TYPE MATERIAL.

GENERAL NOTES:

- 1.) ALL PVC PIPE FOR SANITARY SEWERS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321-89.
- 2.) THERE SHALL BE NO ROCKS OR STONES GREATER THAN 2" IN ANY DIMENSION WITHIN 6" OF THE PIPE WALL OR BELL.
- 3.) EMBEDMENT MATERIALS FOR BEDDING, HAUNCHING AND INITIAL BACK FILL SHALL COMPLY WITH THE REQUIREMENTS OF ASTM D2321-89, CLASSES I, II OR III AND SHALL BE COMPACTED AS NOTED.
- 4.) FINAL BACK FILL SHALL NOT CONTAIN DEBRIS, ORGANIC MATERIAL, FROZEN MATERIAL, UNSTABLE MATERIAL OR BOULDERS OR STONES GREATER THAN 2" IN ANY DIMENSION. FLOWABLE FILL OPTIONAL.
- 5.) THE PLACEMENT AND COMPACTION OF BACK FILL SHALL NOT CAUSE DISPLACEMENT OF THE PIPE.
- 6.) THE FLOWABLE FILL MIX SHALL BE:
 CEMENT - 50#
 FLY ASH - 165#
 SAND - 2746#
 WATER - 60 GAL.
 AIR - 6%
 YIELD - 27.2

PIPE BEDDING DETAIL

NOT TO SCALE.



No.	BY	DATE	REVISION	DATE
1	DRW	2/93		8-3-89
2	DM	5/8/00		
3	HK	3/23/01		
4	JRP	12/10/01	REVISED BORDER & TEXT SIZE	
5	RSG	1/17/11	NOTE #6	



DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION
<input checked="" type="checkbox"/> CIVIL
<input type="checkbox"/> TRAFFIC
<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER

PIPE
BEDDING DETAIL

STANDARD DRAWING
SHEET NO.
WW-6

KINDS OF PIPE FOR SURFACE DRAINAGE

GROUP "G" (SUB GROUPS G1-G2-G3)			
SPAN INCHES	RISE INCHES	AREA SQ. FT.	KIND
18	11	1.1	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
22	13	1.6	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
23	14	1.8	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
25	16	2.2	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
29	18	2.8	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
30	19	3.3	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
34	22	4.1	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
36	22	4.4	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
38	24	5.1	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
42	27	6.3	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
43	27	6.4	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
45	29	7.4	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
50	31	8.7	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
49	32	8.8	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
53	34	10.2	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
58	36	11.4	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
60	38	12.9	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
65	40	14.3	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
68	43	16.6	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
72	44	17.6	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
76	48	20.5	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
79	49	21.3	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
73	55	22	STRUCTURAL PLATE STEEL ARCH
76	57	24	STRUCTURAL PLATE STEEL ARCH
83	53	24.8	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
85	54	25.3	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
81	59	26	STRUCTURAL PLATE STEEL ARCH
84	61	28	STRUCTURAL PLATE STEEL ARCH
91	58	29.5	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
87	63	31	STRUCTURAL PLATE STEEL ARCH
92	65	33	STRUCTURAL PLATE STEEL ARCH
96	63	34.5	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE
95	67	35	STRUCTURAL PLATE STEEL ARCH
98	69	38	STRUCTURAL PLATE STEEL ARCH
103	71	40	STRUCTURAL PLATE STEEL ARCH
106	68	40.1	REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE

GROUP "A"				
DIA. IN INCHES	KIND			
	R.C.	V.C.	D.I.	S.C.
12-24	X	X	X	
30-36	X	X	X	
42-48	X		X	
54	X			
60	X			X
66	X			X
72	X			X
78-84	X			X
90-108	X			X

GROUP "B"			
DIA. IN INCHES	KIND		
	R.C. IV	H.D.I.	S.F.
12-33	X	X	
36-48	X	X	
54	X		
60	X		X
66	X		X
72	X		X
78	X		X
84	X		X

GROUP "C"			
DIA. IN INCHES	KIND		
	H.D.R.C.	E.H.D.I.	S.F.
12-18	X	X	
24-48	X	X	
54	X		
60	X		X
66	X		X
72	X		X

GROUP "D"				
DIA. IN INCHES	KIND			
	R.C.	V.C.	D.I.	S.C.
12-24	X	X	X	
30-36	X	X	X	
42-48	X		X	
54	X			
60	X			X
66	X			X
72	X			X
78-84	X			X
90-108	X			X

GROUP "E"			
DIA. IN INCHES	KIND		
	E.S.R.C.	H.D.I.	S.F.
12-33	X	X	
36-48	X	X	
54	X		
60	X		X
66	X		X
72	X		X
78	X		X
84	X		X

NOTES:
THE KIND OF PIPE PERMITTED FOR EACH SIZE AND GROUP ARE DESIGNATED BY "X"

UNDER GROUPS "D", "E", & "F" FOR 15" DIAMETER PIPE, THE CONTRACTOR AS AN ALTERNATE MAY, USE POLYETHYLENE (PE) OR POLYVINYL CHLORIDE (PVC), PLASTIC CORRUGATED DRAINAGE PIPE.

GROUP "F"			
DIA. IN INCHES	KIND		
	E.S.R.C.	H.D.I.	S.F.
12-18	X	X	
24-48	X	X	
54	X		
60	X		X
66	X		X
72	X		X

GROUP "H"
(SUB GROUPS H1-H2-H3)

GROUP "H" (SUB GROUPS H1,H2,H3) SHALL BE THE SAME AS GROUP "G"(SUB GROUPS G1,G2,G3) FOR 1.1 SQ. FT. AREA TO 17.6 SQ. FT. AREA, INCLUSIVE, EXCEPT THAT C.S. PIPE ARCH OR C.A.A. PIPE ARCH SHALL BE USED INSTEAD OF F.B.C.C.S. PIPE ARCH. WHEN 20.5 SQ. FT. MIN. AREA OR MORE IS SPECIFIED USE GROUP G1,G2, OR G3 AS REQUIRED.

KINDS OF PIPE FOR UNDERDRAINS
GROUP "K"

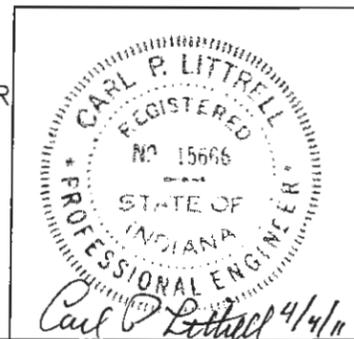
FOR KINDS OF PIPE PERMITTED SEE SECTION ON UNDERDRAINS OF THE INDOT STANDARD SPECIFICATIONS

LEGEND OF ABBREVIATIONS

- | | |
|---|--|
| R.C. - REINFORCED CONCRETE (CLASS III) | E.H.D.I.- EXTRA HEAVY DUCTILE IRON |
| R.C. IV - REINFORCED CONCRETE (CLASS IV) | H.D.I. - HEAVY DUCTILE IRON |
| V.C. - VITRIFIED CLAY CULVERT | H.D.R.C.- HEAVY DUTY REINFORCED CONCRETE (CLASS V) |
| D.I. - STANDARD DUCTILE IRON | S.C. - STRUCTURAL PLATE STEEL |
| E.S.R.C.- EXTRA STRENGTH REINFORCED CONCRETE (CLASS IV) | S.F. - STRUTTED STRUCTURAL PLATE STEEL |

WHEN ELLIPTICAL CONCRETE PIPE IS PERMITTED UNDER THE FOLLOWING GROUPS IT SHALL BE AS SPECIFIED UNDER SECTION M-207 OF THE AASHO SPECIFICATION FOR THE CLASSES PERMITTED -

GROUP G1, H1, OR R1 - CLASS HE II
GROUP G2, H2, OR R2 - CLASS HE III
GROUP G3, H3, OR R3 - CLASS HE IV



No.	BY	DATE	REVISION	DATE
1	D.M.	5/10/00		4-16-93
2	H.K.	3/23/01		
3	JRP	12/10/01	REVISED BORDER & TEXT SIZE	
4	JRP	4/2/02	EDITED SHEET TITLE, ADDED INDOT PIPE SPEC	
5	RSG	1/18/11	REVISED NOTE	



DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION	
<input checked="" type="checkbox"/>	CIVIL
<input type="checkbox"/>	TRAFFIC
<input type="checkbox"/>	WATER
<input type="checkbox"/>	WASTE WATER

PIPE

STANDARD DRAWING
SHEET NO.
WW-7

TYPE OF PIPE FOR STORM AND/OR SANITARY SEWER

GROUP "L"					
DIA. IN INCHES	KIND				
	R.C.	E.S.V.C.	D.I.	S.C.	Y
8-10		×			
12-24	×	×			×
27-36	×	×	×		×
42-48	×		×		×
54	×				
60-84	×			×	1
90-108	×			×	1

R.C. - REINFORCED CONCRETE (CLASS III)
 E.S.V.C.-EXTRA STRENGTH VITRIFIED CULVERT
 D.I. - DUCTILE IRON
 S.C. - STRUCTURAL PLATE STEEL
 E.S.R.C.-EXTRA STRENGTH REINFORCED CONCRETE (CLASS IV)
 R.C. II-REINFORCED CONCRETE SEWER (CLASS II)
 C.S. - CONCRETE SEWER
 V.S. - VITRIFIED SEWER
 R.E.C. - REINFORCED ELLIPTICAL CONCRETE
 Y - POLYVINYL CHLORIDE (PVC) SEWER PIPE

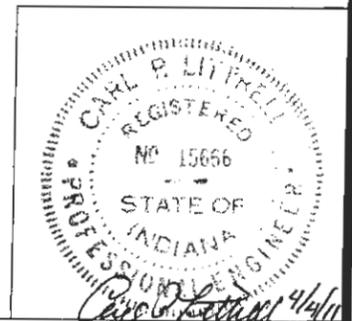
GROUP "M"					
DIA. IN INCHES	KIND				
	E.S.V.C.	E.S.R.C.	S.C.	D.I.	Y
8-10	×				×
12-36		×		×	×
42		×		×	
48		×		×	
54		×			
60-84		×	×		
90-108		×	×		

GROUP "P"					
DIA. IN INCHES	KIND				
	R.C. II	C.S.	V.S.	S.C.	Y
8-10		×	×		×
12-24	×	×	×		×
27-36	×		×		×
42-48	×				
54	×				
60-84	×			×	1
90-108	×			×	1

NOTE: REINFORCED ELLIPTICAL CONCRETE CULVERT PIPE IN GROUP "R1" SHALL BE AS SPECIFIED FOR COVER OF 1' TO 4', IN GROUP "R2" SHALL BE AS SPECIFIED FOR COVER OF 5' TO 10', IN GROUP "R3" SHALL BE AS SPECIFIED FOR COVER OF 11' TO 15'.

×₁ - TO BE USED FOR STORM SEWER ONLY

GROUP "R"		
R.E.C.		
SPAN INCHES	RISE INCHES	AREA SQ. FT.
23	14	1.8
30	19	3.3
34	22	4.1
38	24	5.1
42	27	6.3
45	29	7.4
49	32	8.8
53	34	10.2
60	38	12.9
68	43	16.6
76	48	20.5
83	53	24.8
91	58	29.5
98	63	34.6
106	68	40.1



No.	BY	DATE	REVISION	DATE
1	D.M.	5/10/00		4-16-93
2	H.K.	3/23/01		
3	JRP	12/10/01	REVISED BORDER & TEXT SIZE	APRVD CPL
4	JRP	4/2/02	ADDED INDOT PIPE SPEC	SCALE NONE



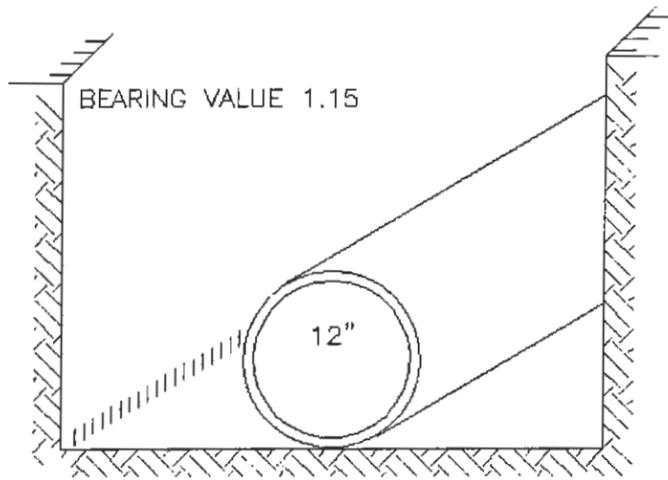
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 CITY OF SOUTH BEND, INDIANA

DIVISION
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<input type="checkbox"/> WATER
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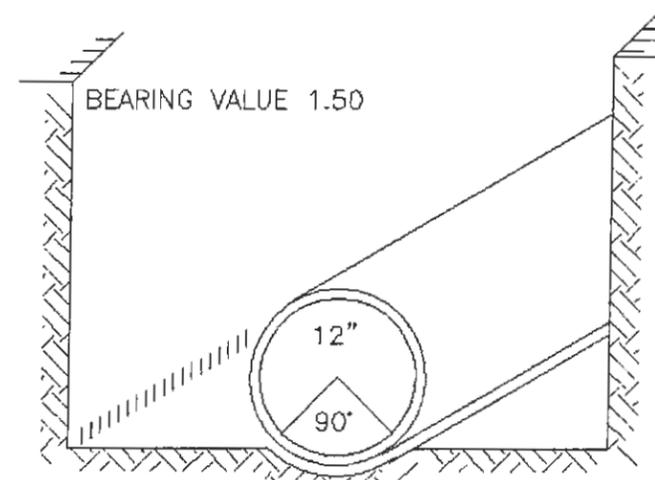
PIPE

STANDARD
DRAWING

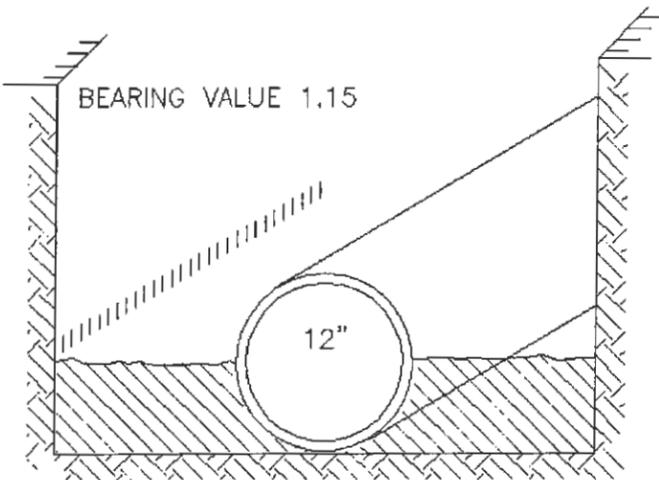
SHEET NO.
WW-8



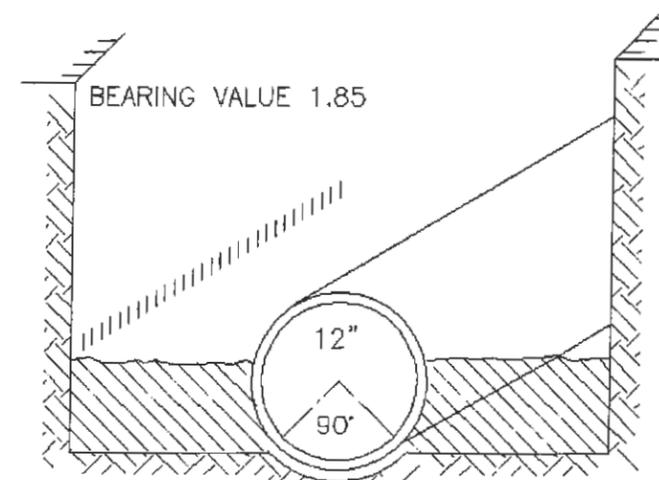
FLAT BOTTOM TRENCH
BACKFILL NOT TAMPED



TRENCH SHAPED TO FIT PIPE
BACKFILL NOT TAMPED



FLAT BOTTOM TRENCH
BACKFILL TAMPED



TRENCH SHAPED TO FIT PIPE
BACKFILL TAMPED



No.	BY	DATE	REVISION	DATE
1	D.M.	5/10/00		8-4-89
2	H.K.	3/23/01		
3	JRP	12/10/01	REVISED BORDER & TEXT SIZE	
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				SCALE
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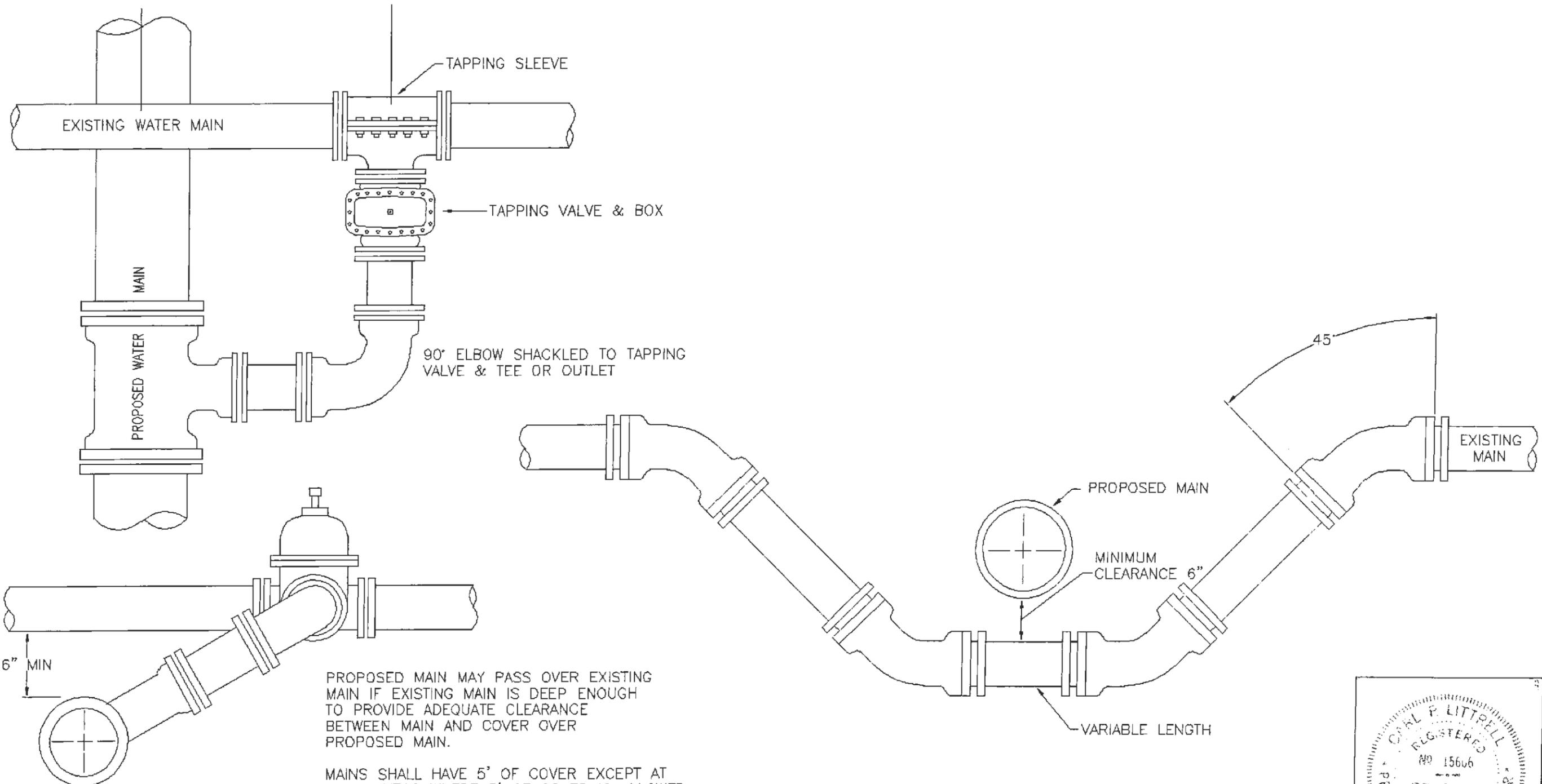


DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION
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<input type="checkbox"/> WASTE WATER

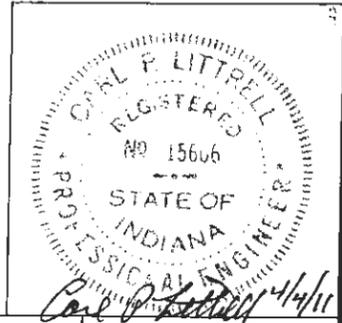
PIPE LAYING
METHODS

STANDARD
DRAWING
SHEET NO.
W-1



PROPOSED MAIN MAY PASS OVER EXISTING MAIN IF EXISTING MAIN IS DEEP ENOUGH TO PROVIDE ADEQUATE CLEARANCE BETWEEN MAIN AND COVER OVER PROPOSED MAIN.

MAINS SHALL HAVE 5' OF COVER EXCEPT AT CROSSOVERS WHERE 3' OF COVER IS ALLOWED FOR NO MORE THAN 4' HORIZONTAL DISTANCE. ALL JOINTS SHALL BE RESTRAINED.



No.	BY	DATE	REVISION	DATE	8-10-89
1	D.M.	5/10/00		DRAWN	EJL
2	H.K.	3/23/01		CHECKED	TV
3	JRP	12/10/01	REVISED BORDER & TEXT SIZE	APRVD	CPL
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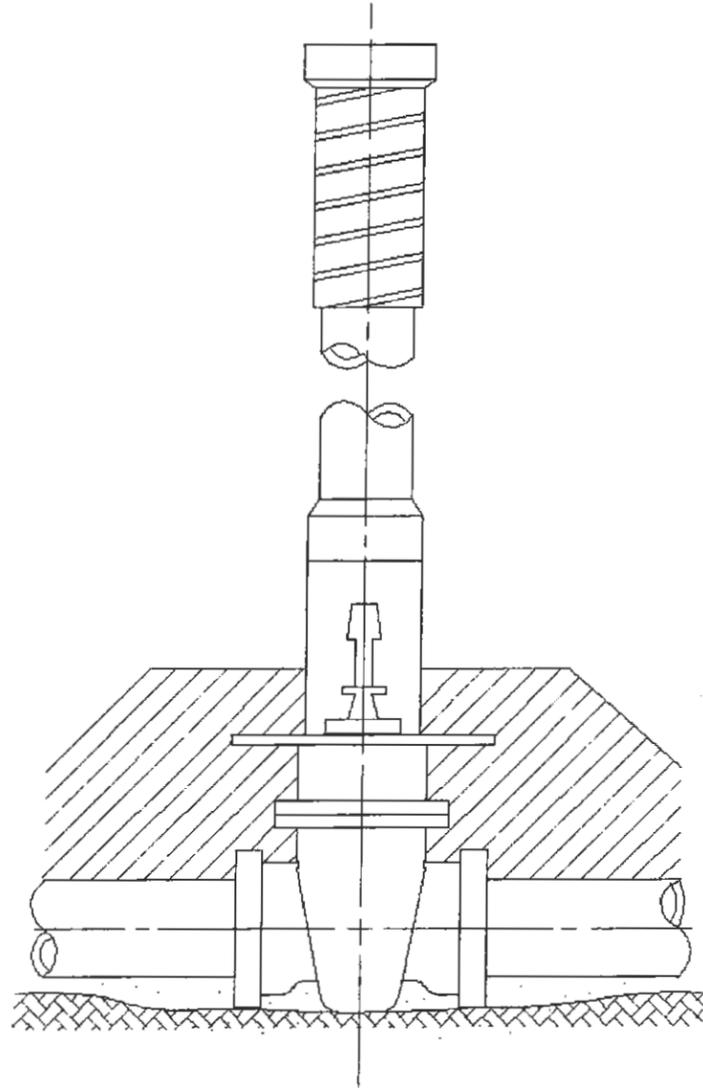


DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

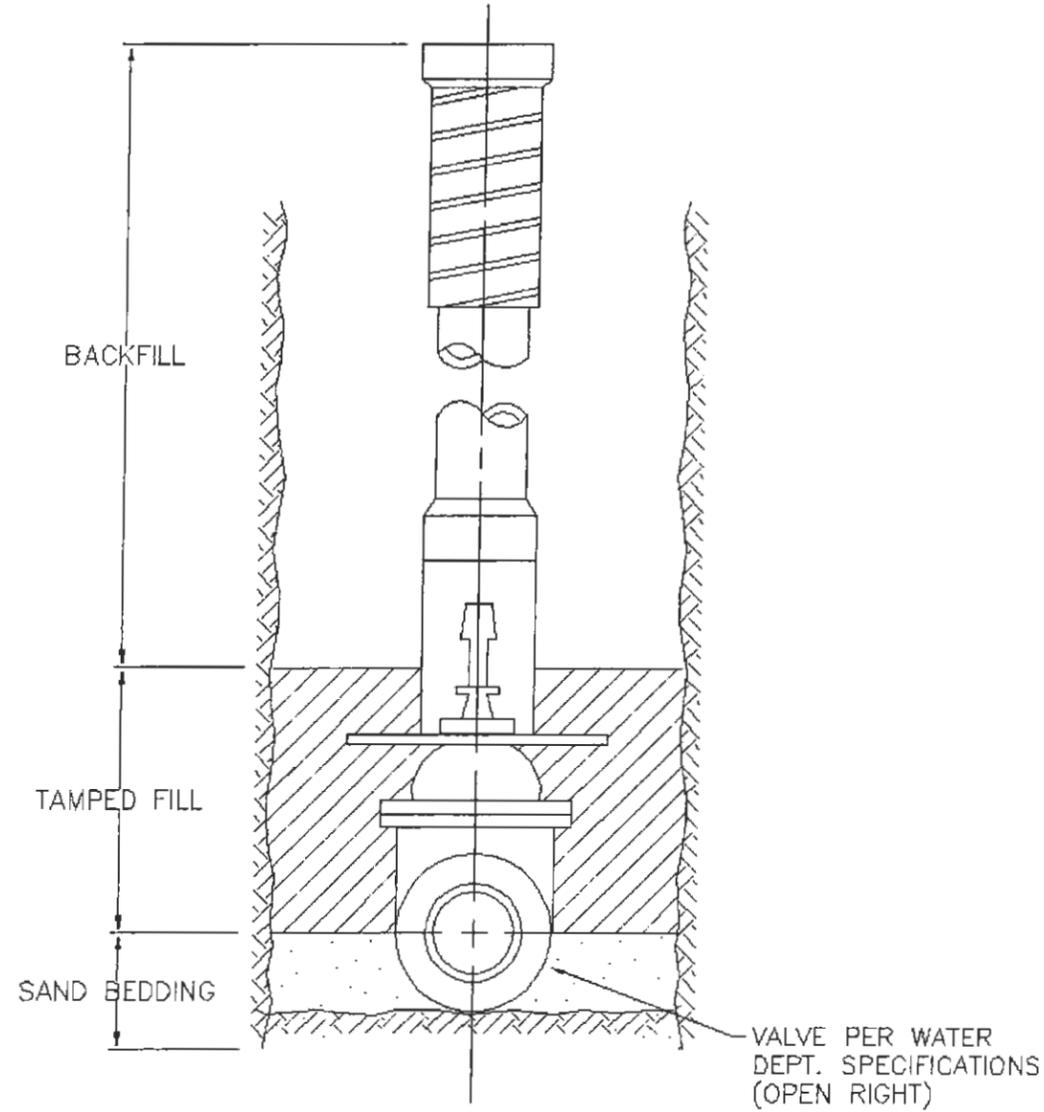
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<input type="checkbox"/> WATER
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CROSS OVER

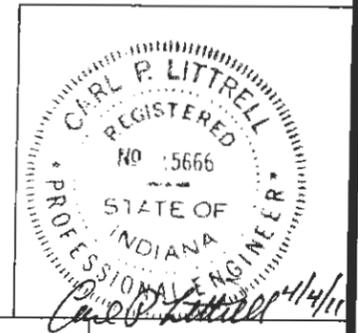
STANDARD DRAWING
SHEET NO.
W-2



ELEVATION VIEW



SECTION VIEW



No.	BY	DATE	REVISION	DATE	8-15-89
1	DRW	2/93		DRAWN	EJL
2	H.K.	10/24/00		CHECKED	TV
3	JRP	12/10/01	REVISED BORDER & TEXT SIZE	APRVD	CPL
				SCALE	NONE



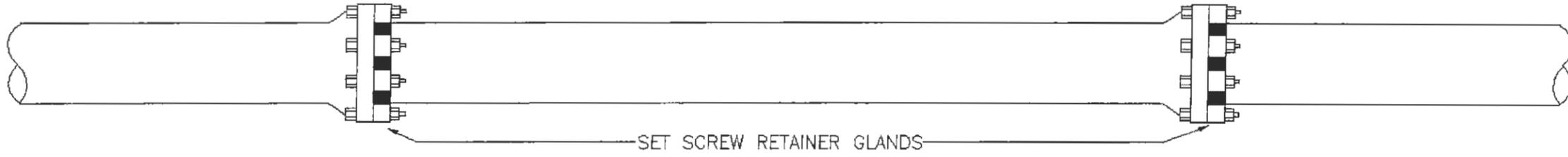
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CITY OF SOUTH BEND, INDIANA

DIVISION	
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<input type="checkbox"/>	TRAFFIC
<input type="checkbox"/>	WATER
<input type="checkbox"/>	WASTE WATER

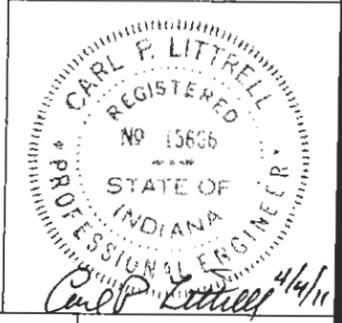
VALVE &
FITTINGS

STANDARD
DRAWING

SHEET NO.
W-3



RESTRAINED JOINTS ON SLIP JOINT PIPE USING SET SCREW RETAINER GLANDS



No.	BY	DATE	REVISION	DATE	8-16-89
1	DM	5/10/00		DRAWN	EJL
2	H.K.	3/23/01		CHECKED	TV
3	JRP	12/10/01	REVISED BORDER & TEXT SIZE	APRVD	CPL
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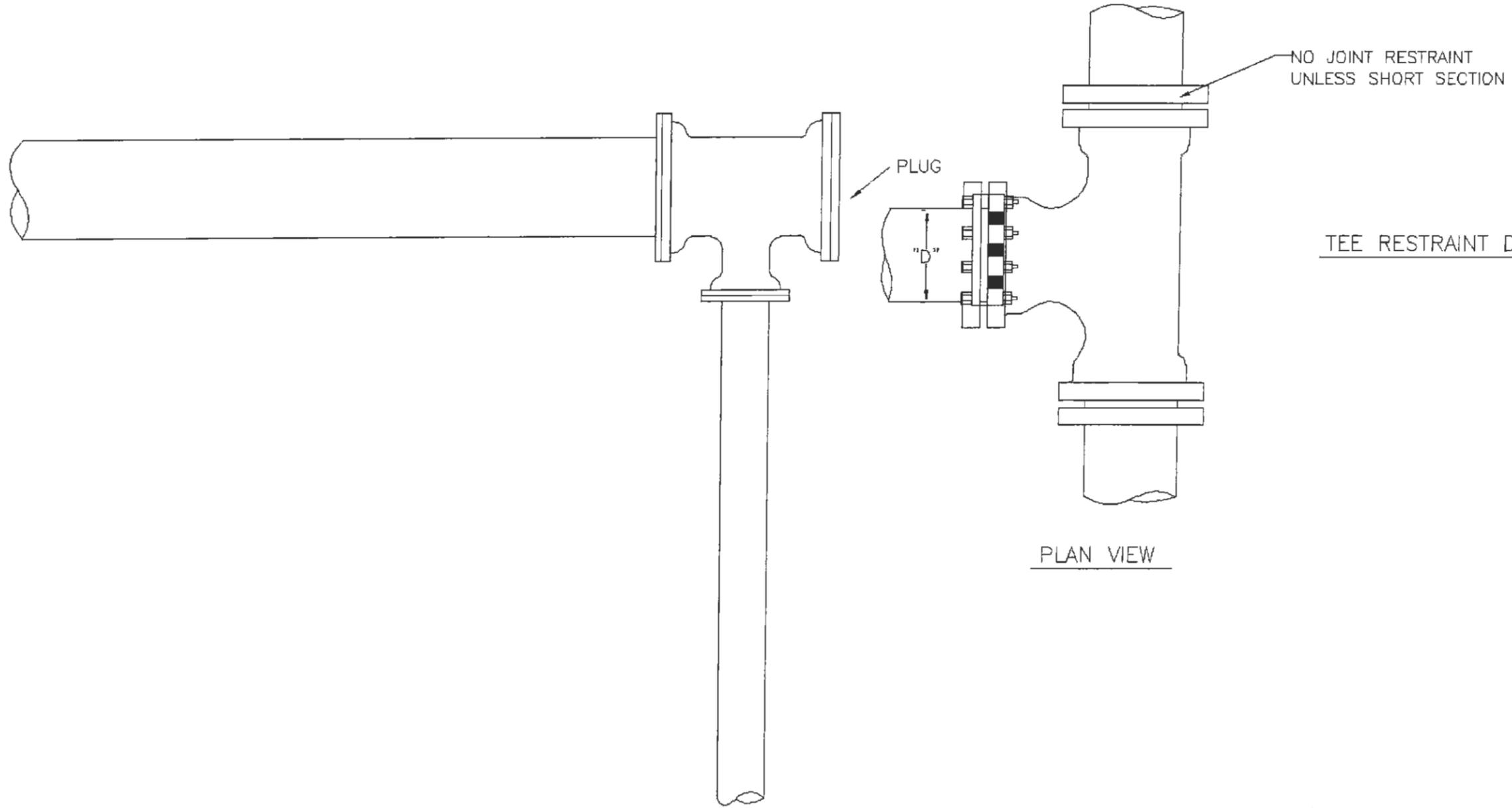
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CITY OF SOUTH BEND, INDIANA

DIVISION
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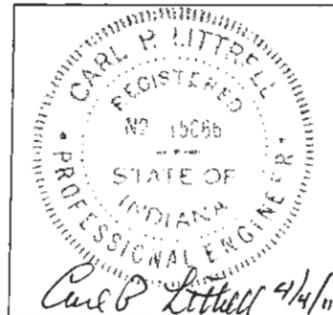
RESTRAINING
METHODS

STANDARD
DRAWING
SHEET NO.
W-4

RESTRAINT OF TEES



THRUST BLOCKING ONLY
IF DESIGNED BY P.E.
WHEN NECESSARY TO HOLD
FORCES ON PIPE



No.	BY	DATE	REVISION	DATE	7-13-89
1	DRW	2/93		DRAWN	EJL
2	H.K.	10/24/00		CHECKED	TV
3	JRP	12/10/01	REVISED BORDER & TEXT SIZE	APRVD	CPL
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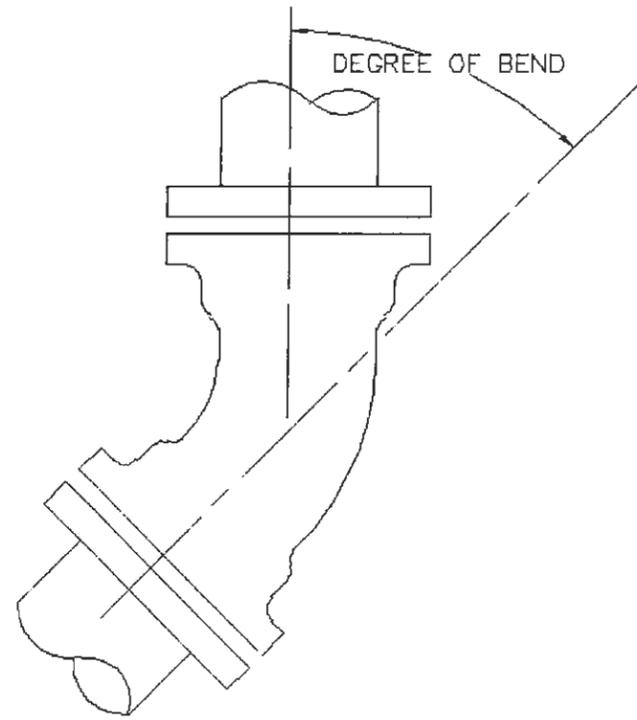


DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

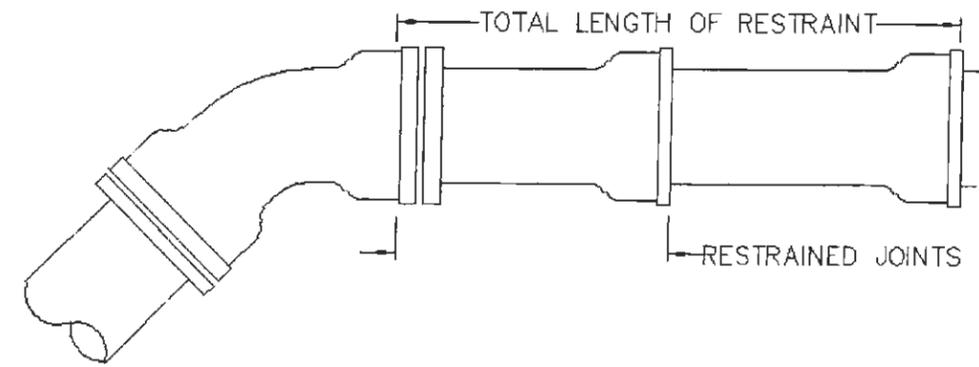
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<input type="checkbox"/> TRAFFIC
<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER

TEES
RESTRAINT & BLOCKING

STANDARD
DRAWING
SHEET NO.
W-5



PLAN VIEW



TIE ROD RESTRAINT

THRUST BLOCKING ONLY
IF DESIGNED BY P.E.
WHEN NECESSARY TO HOLD
FORCES ON PIPE



No.	BY	DATE	REVISION	DATE	8-18-89
1	H.K.	10/24/00		DRAWN	EJL
2	JRP	12/10/01	REVISED BORDER & TEXT SIZE	CHECKED	TV
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				SCALE	NONE

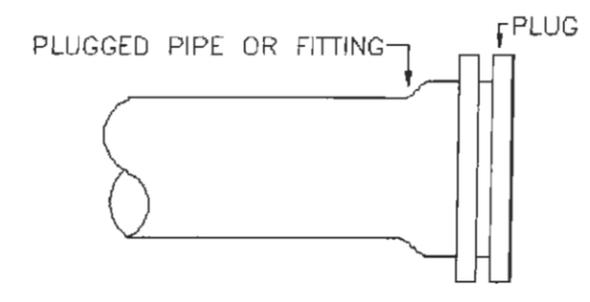
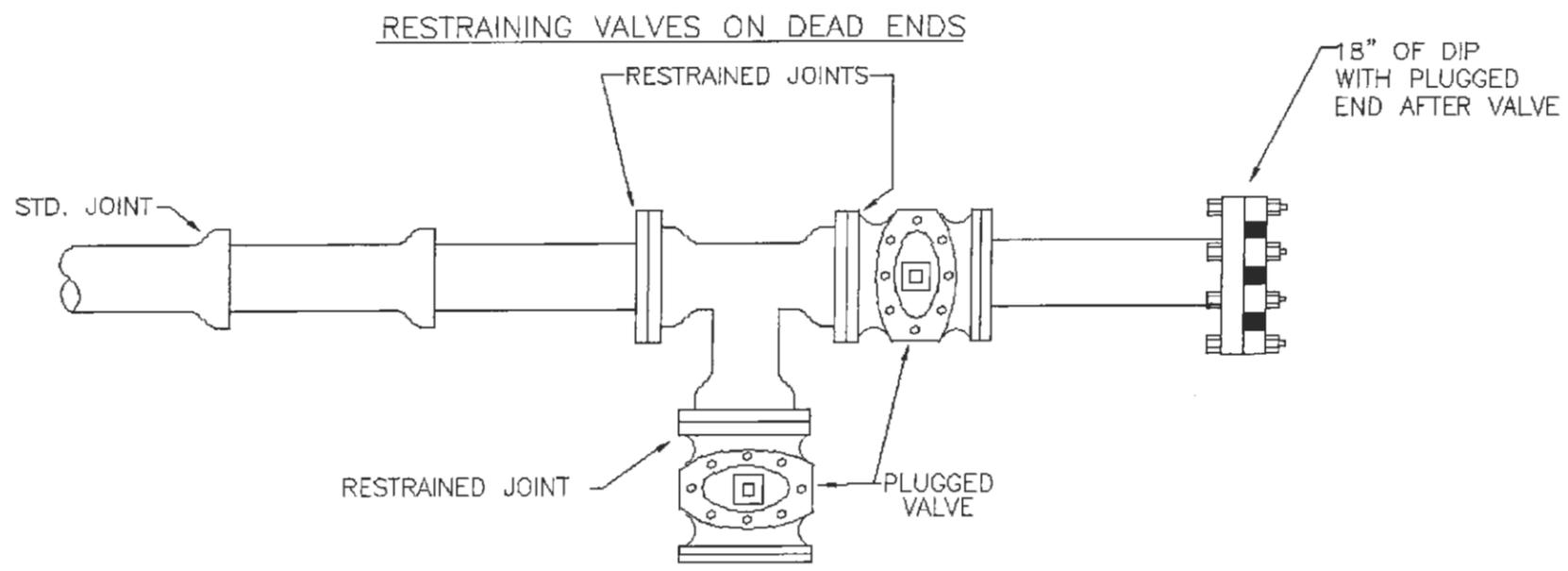


DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION
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<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER

ELBOWS
RESTRAINT & BLOCKING

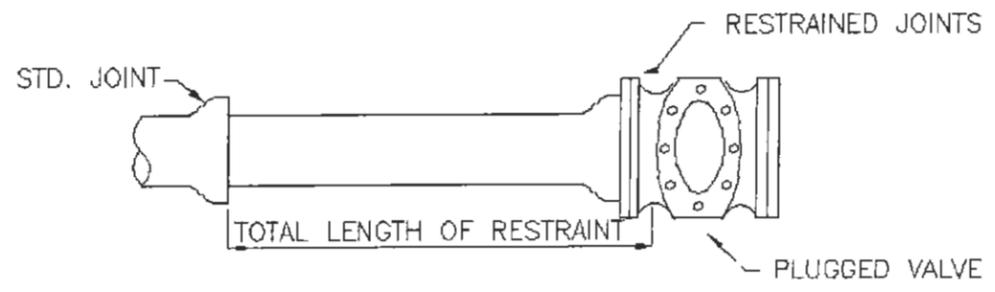
STANDARD
DRAWING
SHEET NO.
W-6



PLAN VIEW

PLUGGED END RESTRAINT DETAIL

DEAD ENDS OF TEES



DEAD END OF MAINS
TIE ROD RESTRAINT

THRUST BLOCKING ONLY
IF DESIGNED BY P.E.
WHEN NECESSARY TO HOLD
FORCES ON PIPE



NOTE:

LENGTH OF RESTRAINT SAME AS FOR 90° ELBOW & DEAD ENDS.
SEE CONSTR. STD. W-9 FOR LENGTH AND METHOD OF RESTRAINT.

No.	BY	DATE	REVISION	DATE	8-23-89
1	H.K.	10/24/00		DRAWN	EJL
2	JRP	12/10/01	REVISED BORDER & TEXT SIZE	CHECKED	TV
				APRVD	GPL
				SCALE	NONE



DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION
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<input type="checkbox"/> TRAFFIC
<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER

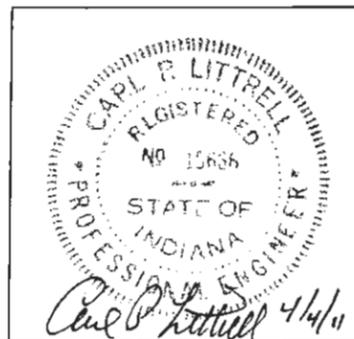
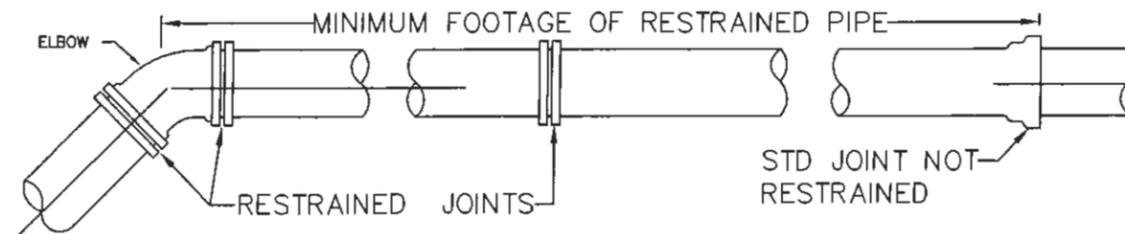
DEAD END MAINS
RESTRAINT & BLOCKING

STANDARD
DRAWING
SHEET NO.
W-7

NUMBER & SIZE OF RESTRAINING RODS TO USE FOR VARIOUS DEGREES OF ELBOWS & DIAMETERS OF PIPE				
DIA.	11-1/4°	22-1/2°	45°	90° OR DEAD END MAIN
4"	NONE REQD	NONE REQD	2-1/2"	2-1/2"
6"	NONE REQD	2-1/2"	2-1/2"	2-1/2"
8"	NONE REQD	2-1/2"	2-1/2"	4-1/2"; 4-5/8"; 2-3/4"
10"	NONE REQD	2-1/2"	2-1/2"	6-1/2"; 4-5/8"; 4-3/4"
12"	NONE REQD	2-1/2"	4-1/2" OR 2-5/8"	8-1/2"; 6-5/8"; 4-3/4"
16"	2-1/2"	2-1/2"	4-1/2"; 4-5/8"; 2-3/4"	8-5/8" OR 6-3/4"
20"	2-1/2"	2-1/2"	6-1/2"; 4-5/8"; 4-3/4"	12-5/8" OR 8-3/4"
24"	2-1/2"	4-1/2" OR 2-5/8"	8-1/2"; 6-5/8"; 4-3/4"	12-3/4"

ABOVE FIGURES BASED ON DESIGN CRITERIA AS FOLLOWS:
 INTERNAL PRESSURE = 200 PSIG (INC. WATER HAMMER)
 SAFETY FACTOR = 2.5 MIN.
 ULTIMATE STRENGTH FOR TIE ROD MATL = 75,000 PSI
 THREAD SIZES = AMERICAN COARSE, LOOSE FIT

MINIMUM FOOTAGE OF RESTRAINED PIPE FOR VARIOUS DIAMETERS & DEGREES CAST & DUCTILE IRON ELBOWS												
COVER DIA. MAIN	DEGREE OF ELBOW											
	11-1/4			22-1/2			45°			90°		
	4'	5'	8'	4'	5'	8'	4'	5'	8'	4'	5'	8'
4"	-	-	-	-	-	-	3	3	2	10	8	5
6"	-	-	-	2	-	-	5	4	2	14	12	7
8"	-	-	-	2	2	-	6	5	3	20	16	10
10"	-	-	-	3	2	1	8	7	4	28	22	14
12"	-	-	-	3	3	2	12	9	6	39	30	19
16"	2	1	-	5	4	3	17	14	9	58	47	30
20"	2	2	-	6	5	3	22	18	12	75	62	40
24"	2	2	-	7	6	4	26	21	14	88	73	47
30"	3	2	-	9	7	5	29	26	18	104	86	57
36"	3	3	-	11	9	6	39	34	22	128	111	70
42"	3	3	-	12	10	7	42	35	24	139	116	78
48"	4	3	-	13	11	7	47	39	26	155	129	86
54"			-			8			30			98



No.	BY	DATE	REVISION	DATE	8-7-89
1	DM	5/10/00		DRAWN	EJL
2	H.K.	3/23/01		CHECKED	TV
3	JRP	12/10/01	REVISED BORDER & TEXT SIZE	APRVD	CPL
4	RSG	10/18/04	REVISED BDEGREE OF ELBOW	SCALE	NONE

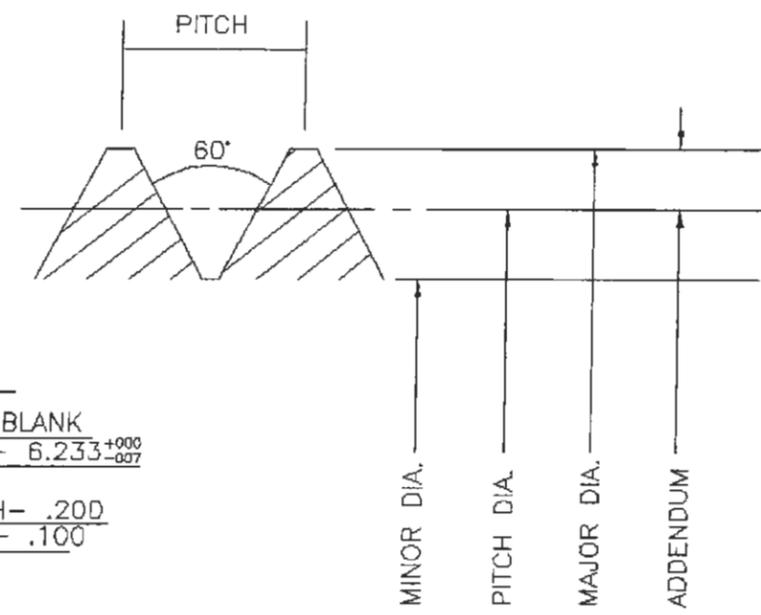
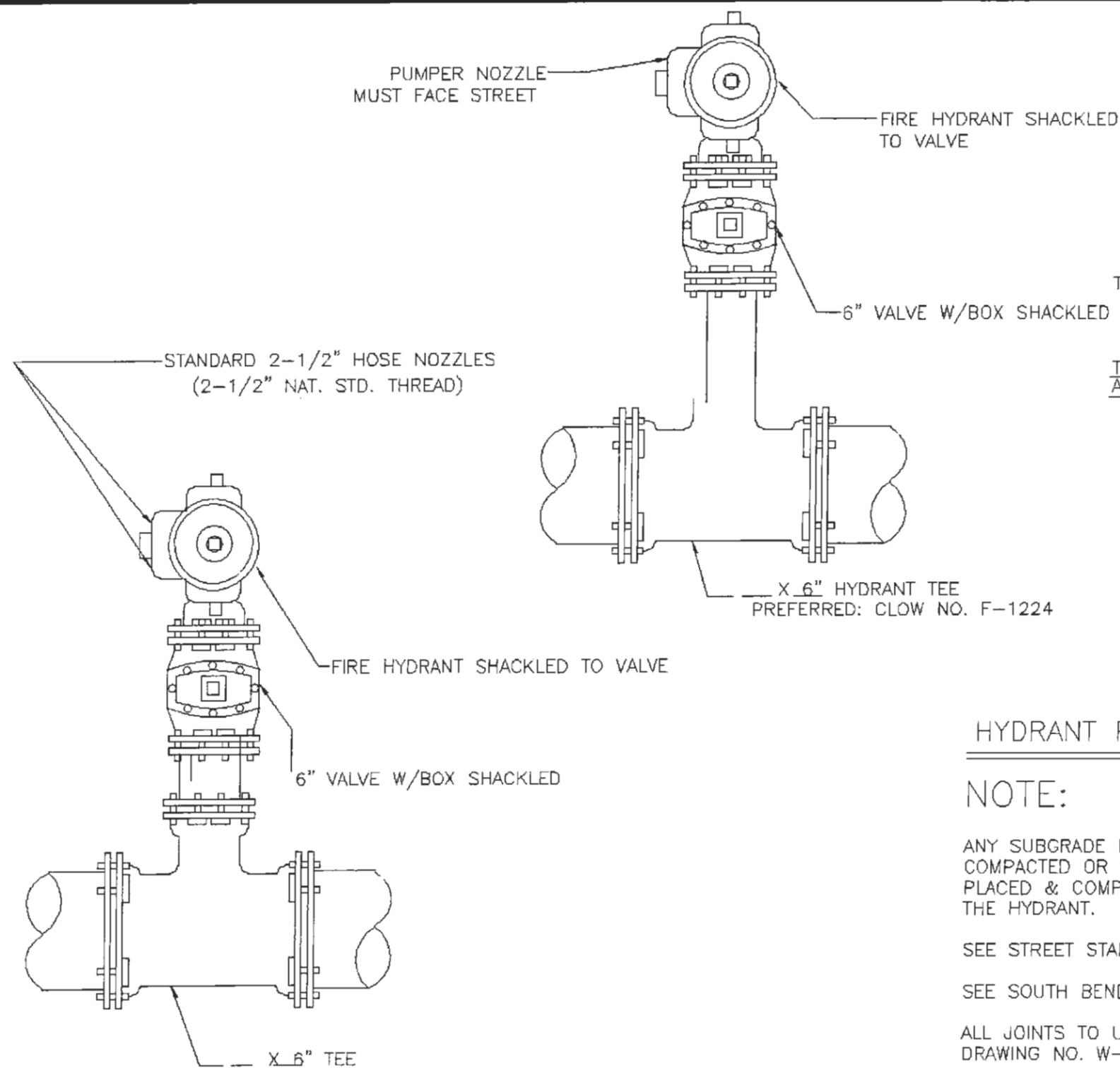


DEPARTMENT OF PUBLIC WORKS
 CITY OF SOUTH BEND, INDIANA

DIVISION
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<input type="checkbox"/> TRAFFIC
<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER

RESTRAINING
 DESIGN CRITERIA

STANDARD
 DRAWING
 SHEET NO.
 W-8



THD. FORM—
 MALE BLANK
 O.D. — 6.233^{+0.00}_{-0.07}

THD. DEPTH— .200
 ADDENDUM— .100

PITCH— 0.250
 P.D. TOLERANCE +0.014

MALE			THREAD — 6.233-4 SHARP "V" 5" — SOUTH BEND F.D. THREAD
	MAX.	MIN.	
MAJOR DIA.	6.233	6.226	
PITCH DIA.	6.033	6.026	
MINOR DIA.	5.833	5.826	

HYDRANT PUMPER NOZZLE THREAD (5" SUCTION HOSE)

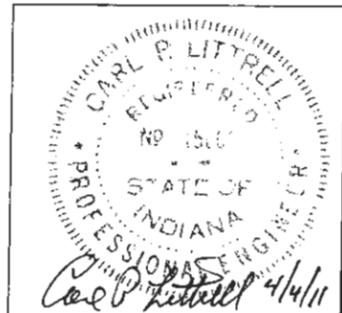
NOTE:

ANY SUBGRADE DISTURBED BENEATH HYDRANT SHALL BE THOROUGHLY COMPACTED OR SUITABLE MATERIAL SHALL BE FURNISHED, PLACED & COMPACTED TO PROVIDE A FIRM FOUNDATION FOR THE HYDRANT.

SEE STREET STANDARDS FOR MAIN & HYDRANT LOCATIONS

SEE SOUTH BEND WATER WORKS STANDARD DRAWING NO. 108 & 109.

ALL JOINTS TO USE JOINT RESTRAINTS AS SPECIFIED ON STANDARD DRAWING NO. W-5.



No.	BY	DATE	REVISION	DATE	12-14-89
1	DRW	2/93		DRAWN	ADH
2	DM	5/10/00		CHECKED	TV
3	HK	3/23/01		APRVD	CPL
4	JRP	12/10/01	REVISED BORDER & TEXT SIZE	SCALE	NONE

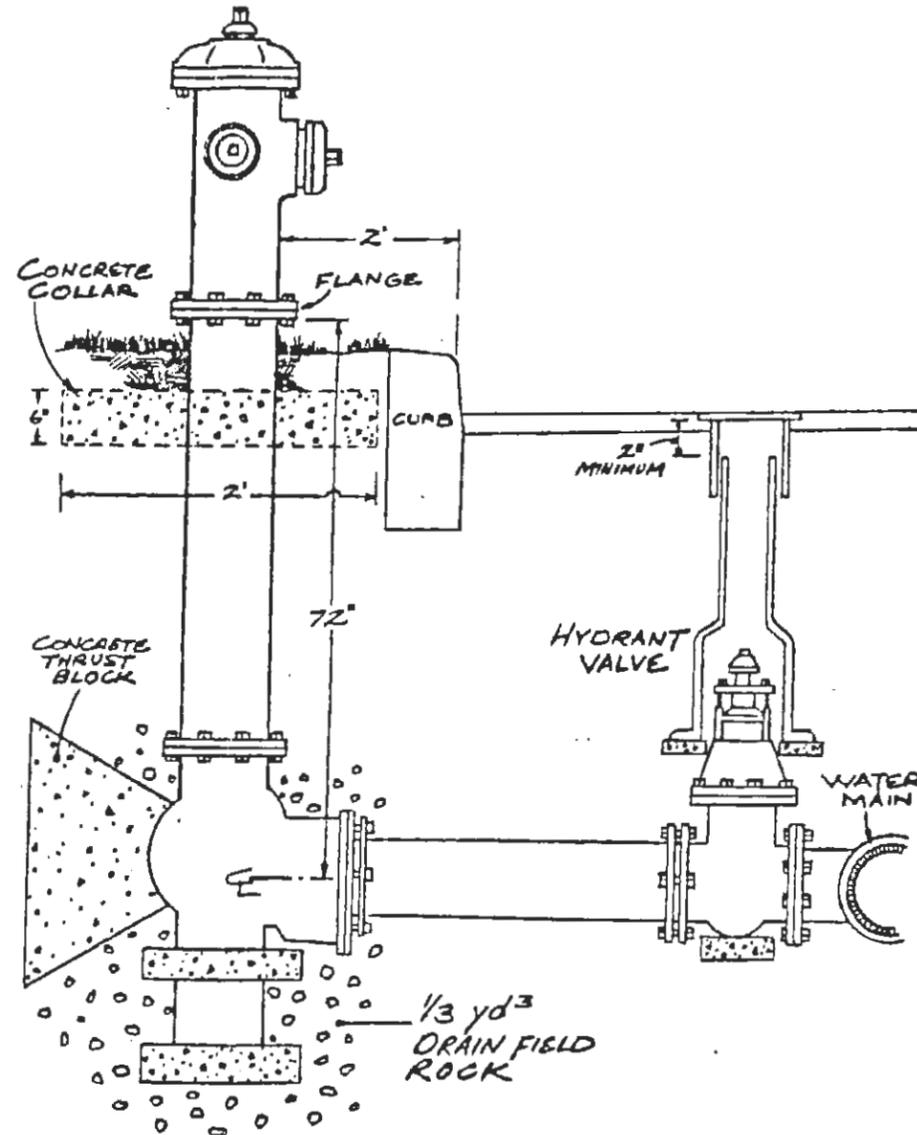
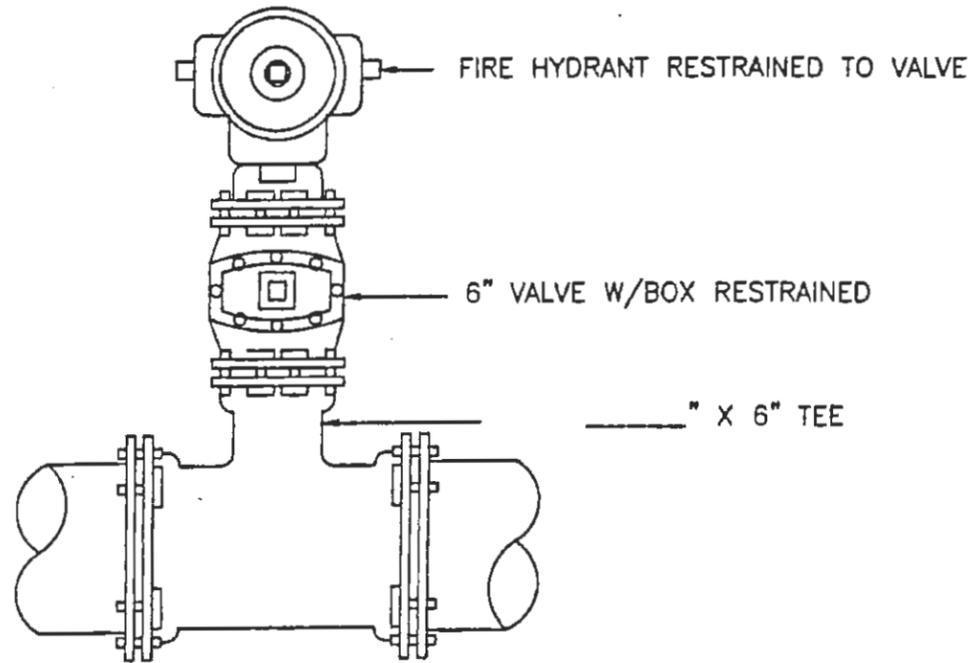


DEPARTMENT OF PUBLIC WORKS
 CITY OF SOUTH BEND, INDIANA

DIVISION	
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<input type="checkbox"/>	TRAFFIC
<input type="checkbox"/>	WATER
<input type="checkbox"/>	WASTE WATER

FIRE HYDRANT
 ASSEMBLY

STANDARD
 DRAWING
 SHEET NO.
 W-9



NOTE:

HYDRANT PAINTING: HYDRANTS TO BE PAINTED RED, WHITE AND BLUE WITH RUST-O-LASTIC PAINT OR EQUAL PRODUCT THAT IS APPROVED BY CITY OF SOUTH BEND WATER WORKS DEPARTMENT.

LEGEND:

- ① COASTAL BLUE 074-5261
- ② FIRE PROTECTION RED 074-4091
- ③ WHITE 074-1651

NOTE:

ANY SUBGRADE DISTURBED BENEATH HYDRANT SHALL BE THOROUGHLY COMPACTED OR SUITABLE MATERIAL SHALL BE FURNISHED, PLACED & COMPACTED TO PROVIDE A FIRM FOUNDATION FOR THE HYDRANT

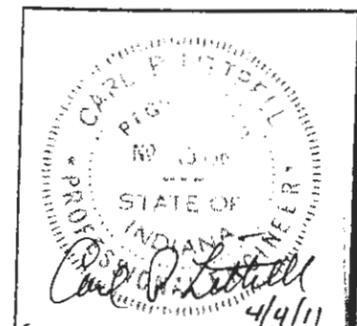
NOTE:

SEE STREET STANDARDS FOR MAIN & HYDRANT LOCATIONS. FOR SITUATIONS WHERE HYDRANT LOCATION IS CLOSE TO WATER MAIN SEE STANDARD DRAWING W-11

NOTE:

FOR HYDRANT PUMPER NOZZLE THREAD (5" SUCTION HOSE) SEE STANDARD DRAWING W-11

HYDRANT DRAINAGE: TO PREVENT FREEZING OF THE HYDRANT BARREL IF IT WERE NOT DRAINED, A DRAINAGE PIT 2' X 2' X 2' SHALL BE EXCAVATED BELOW THE HYDRANT AND FILLED WITH COURSE GRAVEL OR CRUSHED STONE MIXED WITH SAND TO A DEPTH OF 6" ABOVE THE HYDRANT OPENING, PROVIDING SUFFICIENT AGGREGATE VOID SPACE TO MORE THAN EQUAL THE VOLUME OF THE BARREL THE DRAINAGE PIT SHOULD NEITHER BE NEAR, NOR HAVE A CONNECTION TO, A SEWER.



No.	BY	DATE	REVISION	DATE	9-14-89
1	DRW	2/93		DRAWN	ADH
2	DM	5/10/00		CHECKED	TV
3	HK	3/23/01		APRVD	CPL
4	JRP	12/10/01	REVISED BORDER & TEXT SIZE		SCALE
5	RSG	1/7/05	PAINTING HYDRANT PLAN		NONE



DEPARTMENT OF PUBLIC WORKS
CITY OF SOUTH BEND, INDIANA

DIVISION
<input checked="" type="checkbox"/> CIVIL
<input type="checkbox"/> TRAFFIC
<input type="checkbox"/> WATER
<input type="checkbox"/> WASTE WATER

FIRE HYDRANT
ASSEMBLY

STANDARD
DRAWING

SHEET NO.
W-10

CITY OF SOUTH BEND, INDIANA DEPARTMENT OF PUBLIC WORKS
PREVAILING SPECIFICATIONS FOR PUBLIC WORKS

Revised: April, 2011

Pete Buttigieg
Mayor

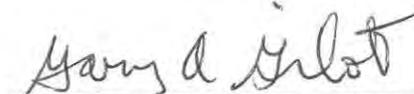
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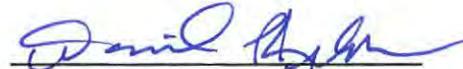
August 11, 2015




Patrick C. Kerr, PhD, PE
City Engineer

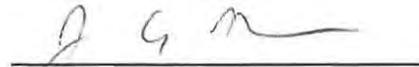
BOARD OF PUBLIC WORKS

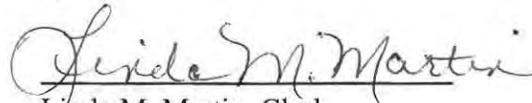

Gary A. Gilot, President


David P. Relos, Member


Brian J. Pawlowski, Member

Elizabeth A. Maradik, Member


James A. Mueller, Member


Linda M. Martin, Clerk

ATTEST:

CITY OF SOUTH BEND, INDIANA PREVAILING SPECIFICATIONS

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SECTION I
PREVAILING SPECIFICATIONS FOR PUBLIC WORKS

The PREVAILING SPECIFICATIONS of the City of South Bend, Indiana shall consist of a combination of the following:

- A. The Standard Specifications of the Indiana State Highway, 2010 Edition (or most recent edition), hereinafter referred to as "State Specifications", except as modified in the paragraph below.
- B. The City Supplemental Specifications, latest edition, including revisions, as issued by the Board of Public Works. These City Supplemental Specifications include additions to and modifications of the State Specifications plus all specifications, and hereinafter referred to as "City Specifications".
- C. Should any provision in the City Supplemental Specifications conflict with any provision in the State Specifications, the City Supplemental Specifications shall prevail.
- D. It is required that any Agency or Individual that engages in public works within the corporate limits in the City of South Bend abide by these **PREVAILING SPECIFICATIONS**. Copies of the **PREVAILING SPECIFICATIONS** will be issued, minus the State Specifications, by the Department of Public Works. State Specifications must be procured from the Engineer of Specifications, INDOT, Indianapolis, Indiana or are available for review in the City Engineer's Office.
- E. The **DESIGN AND CONSTRUCTION STANDARDS** of the City of South Bend are hereby made a part of the PREVAILING SPECIFICATIONS.
- F. **AGREEMENT AND DOCUMENT REQUIREMENTS** -Any and all firms or companies entering into an agreement or contract with the City of South Bend Board of Public Works shall utilize standard agreements and forms approved and provided by the City of South Bend Legal Department and Board of Public Works, or their duly authorized representative. ONLY the Board of Public Works may approve exceptions to this requirement.
- G. These STANDARDS will be issued by the Department of Public Works for the use in the design and construction of Public Works. The Department of Public Works reserves the right to add, to delete from or amend these STANDARDS upon approval of the Board of Public Works.

SECTION II
CITY SUPPLEMENTAL SPECIFICATIONS

- A. The State Specifications are hereby adopted for inclusion in the Prevailing Specifications; however the following modifications shall apply:

SECTION 101 - DEFINITIONS AND TERMS

101.17 Delete in its entirety and substitute the following:

1. Director -The Director of Public Works who is responsible for administering Public Works.

101.18 Delete in its entirety

101.20 Delete in its entirety and substitute the following:

1. Engineer -The Director of Public Works, duly appointed by the Mayor, acting directly through his duly authorized representative(s).

101.35 Delete in its entirety and substitute the following:

1. State -The City of South Bend, Indiana acting through its authorized representative.

101.56 Delete in its entirety and substitute the following:

1. State -The City of South Bend, Indiana acting through its authorized representative.

101.90 Add Section:

1. Developer -Any private party or private company who invests in and develops land with commercial or residential structures within or for annexation to the City of South Bend corporate limits.

SECTION 102- BIDDING REQUIREMENTS AND CONDITIONS

- A. State Section 102 is deleted in its entirety and the following section 102 shall apply:

102.1 BIDPACKET:

1. The Prospective bidder may obtain a Bid Packet from the designated plan room as stated in the Notice to Bidders.
 - a. A bid packet will be available for review commencing on the 1st published date of advertisement in the office of the Board of Public Works located at 227 W. Jefferson Blvd., County-City Bldg. Rm. 1316, South Bend, IN 46601.
2. Each Packet shall include the following:
 - a. City of South Bend Contractor's Bid Form for Public Work (Most Recent)
 - b. Part I – Signed Bid Sheet

- c. Part II - Experience Questionnaire, Plan and Equipment Questionnaire, Contractor's Financial Statement
 - d. Part III - Non-collusion Affidavit, Non-debarment Affidavit, Non-discrimination Commitment for Contractors, and Certification of use of United States Steel Products
 - i. City of South Bend Contractor's Bid for Public Work Proposal form.
 - ii. Project Special Provisions.
 - iii. Project drawings, including Standards (if required).
 - iv. Current EEO requirements.
 - v. Prevailing Wage Rates applicable to the project
3. The Bidder is expected to furnish the following with each Proposal, at his own expense:
- a. Bid Surety, (See Section 102.02)
 - b. City of South Bend Contractor's Bid for Public Work Form completed in its entirety
 - c. Attachments to proposal if specifically required in the Special Provisions.

102.2 BID SURETY

1. The Proposal must be accompanied by a Bid Surety to insure the execution of the Contract.
 - a. This Surety shall be in the form of a certified check, cash or a Bid Bond in the Amount of 5% of the Bid.
 - b. The Surety shall be made out to "Board of Public Works, South Bend, Indiana".
2. The City will return the Bid Surety to the unsuccessful bidder (s) upon selection of the successful bidder(s).
 - a. The Bid Surety of the successful bidder(s) will be returned after delivery of the required performance bond.

102.3 COMPETENCY OF BIDDERS

1. The Standard Questionnaires and Financial Statement for Bidders (Part II of Bid Form) prescribed by the State Board of Accounts of Indiana, must be filled out, notarized and submitted with each bid to the Board of Public Works.

102.4 INTERPRETATION OF QUANTITIES

1. The quantities appearing in the itemized proposal are approximate only and are prepared for the comparison of bids.
2. Payment to the Contractor will be made only for the actual quantities of work performed and accepted or materials furnished in accordance with the contract.
3. The scheduled quantities of work to be done and materials to be furnished may be increased, decreased, or omitted as hereinafter provided.

102.5 EXAMINATION OF PLANS, SPECIFICATIONS, SPECIAL PROVISIONS AND SITE OF WORK

1. The Board of Public Works will approve full, complete, and accurate plans and specifications for each project.
 - a. The bidder is expected to examine carefully the site of the proposed work, the proposal plan specifications, supplemental specifications, special provisions, and contract forms before submitting a bid.
 - b. The submission of a bid shall be considered prima facie evidence that plans, specifications, supplemental specifications, special provisions, and contract.
2. Information pertaining to exploration, borings, test pits, and other preliminary investigations may appear on the plans.
 - a. While such data will have been collected with reasonable care, there is no expressed or implied guarantee that conditions so indicated are entirely representative of those actually existing, or that unanticipated developments may not occur.
3. These investigations will have been made only for use by the Engineer in the preparation of the design.
 - a. Actual subsoil or other conditions may be found to exist during the progress of construction.

- b. The bidders shall make his or her own determination as to existing conditions, materials to be excavated, soil through which piles may be driven and all other contingencies including those found underground.

102.6 PREPARATION OF BID

1. The Bidder shall submit his bid on the forms furnished by the Board of Public Works.
2. Each bid shall consist of the following:
 - a. City of South Bend Contractor's Bid for Public Work Form, completely filled in and showing the gross amount of the bid.
3. Itemized proposal completely filled in, showing the bidders price for each unit of work and the gross amount of the bid.
 - a. The itemized proposal shall be stapled to the Bid Form, for submission to the Board of Public Works.
 - b. The bidder is cautioned to check all multiplication of unit prices and the addition of extension since the award will be based on the corrected Gross Amount of Bid.**
4. Bid Surety. (See Section 102.02)
5. City of South Bend Contractor's Bid for Public Work Form, Part II, (See Section 102.03)
6. Current EEO requirements.
7. See section 103.01 for requirements on consideration of bid. Take special note of the 50% self-perform requirements.
8. The Bidder is cautioned to add no qualifying statements of offers of extra work of materials to his Proposal unless specifically requested to do so in the Special Provisions.
 - a. Violations of this requirement can be cause for rejection of his Bid.

102.7 DELIVERY OF BID

1. Each bid shall be submitted in a sealed envelope on which is written "Sealed Bid for (Name of Project)" and shall bear the name and address of the Bidder.
 - a. Bids shall be addressed to the Clerk, Board of Public Works, City of South Bend, 13th floor County City Building, South Bend, Indiana 46601.

2. All bids shall be received by the Clerk of the Board of Public Works by the specified time in the "Notice to Bidders".
3. Bids received by the Clerk after designated time will be returned to the bidder Unopened.

102.8 PUBLIC OPENINGS OF BID

1. Bids will be opened and read publicly at the date and time specified on the Notice to Bidders.
2. The Board of Public Works reserves the right to waive non-substantive irregularities in the bids received.

102.9 WAGE STIPULATION

1. The successful bidder must comply with the determination of the prevailing scale of wages made in connection with this project in accordance with JC 36-1-12-15- & 5-16-7.
2. In the case of Federal funded projects, the successful bidder must comply with the determination of the prevailing scale of wages made in connection of this project in accordance with the Davis-Bacon Act.

SECTION 103 - AWARD AND EXECUTION OF CONTRACT

- A. State Section 103 is deleted in its entirety and the following section 103 shall apply:

103.1 CONSIDERATION OF BID

1. After the bids are opened and read publicly, they will be evaluated to determine the lowest responsive and responsible bidder.
2. On bids requiring unit prices, the unit bid will prevail over the extension in the event of a discrepancy.
3. The Board of Public Works reserves the right to reject all bids, if in the judgment of the Board it is in the best interests of the City to do so.
4. Each Contractor shall have experience in the type of project that is bid. This requirement shall be evaluated by the Board of Public Works, or their duly authorized representative, based on their experience questionnaire.
5. The Bidding contractor shall self-perform at least 50% of the work as determined by a cost comparison of the bid items to be performed by the bidder to the gross amount of the entire bid.

- a. The Board reserves the right to award a contract to a bidder not performing 50% of the work under special circumstances as determined solely by the Board of Public Works.

103.2 AWARD OF CONTRACT

1. The award will be made within sixty (60) calendar days after the bid opening unless statute provides otherwise.
2. However, the award may be delayed as agreed upon by mutual consent of the Board of Public Works and the bidder.

103.3 EXECUTION AND APPROVAL OF CONTRACT – The successful bidder shall execute the contract form furnished by the Board of Public Works.

103.4 PAYMENT, PERFORMANCE, AND MAINTENANCE BOND

1. The Contractor shall execute within ten (10) working days of award, a payment bond to the Board of Public Works, approved by and for the benefit of the City in an amount equal to the contract price.
 - a. The payment bond is binding on the contractor, the subcontractor(s), and their successors and assigns for the payment of all indebtedness to a person for labor and service performed, material furnished, or services rendered.
 - b. The payment bond must state that it is for the benefit of the subcontractors, laborers, material suppliers, and those performing services.
2. The payment bond shall be deposited with the Board. The payment bond must specify that:
 - a. Modification, omission, or addition to the terms and conditions of the public work contract, plans, specifications, drawings, or profile;
 - b. A defect in the public work contract; or
 - c. A defect in the proceedings preliminary to the letting and awarding of the public work contract; does not discharge the surety.
 - i. The surety of the payment bond may not be released until one (1) year after the Board's final settlement with the contractor.
3. The contractor shall also furnish within ten (10) working days of award a performance bond in a penal sum of at least one hundred percent (125%) of the amount of the contract.

4. The contractor shall also submit a three year maintenance bond in the sum of ten percent (10%) of the final amount of the contract and a waiver of lien after the project is complete.

103.5 INSURANCE REQUIREMENTS

1. All Contractors and subcontractors doing business with the City of South Bend Shall present a Certificate of Insurance showing coverage in the following minimum amount:
 - a. General Liability: Premises-Completed Operations or Products and Bodily Injury Combined Single Limit-\$5,000,000 or \$750,000 per person. Property Damage Combined Single Limit-\$6,000,000 or \$1,000,000 per occurrence.
 - b. There shall be no exclusion for explosion, collapse or underground hazard.
 - c. Workmen's Compensation: Statutory State of Indiana Employer's Liability -\$100,000.
 - d. Auto Liability: Bodily Injury and Property Damage Combined Single limit -\$1,000,000.
 - e. The City of South Bend shall be named as additional insured on the Certificate.

SECTION 105-CONTROL OF WORK

1. The following sections shall be modified or added as indicated:

105.08 (a) DELETE THIS SECTION IN ITS ENTIRETY

105.16 (c) DELETE THIS SECTION IN ITS ENTIRETY

ADD 105.17 APPROVAL OF PLANS

1. Whenever new construction affects public right-of-way for grades, drainage or traffic control the plans must be approved by the Engineer prior to start of work, and issuance of excavation or curb cut permit if required.
2. Approval shall be based on existing City ordinance and Federal Transportation requirements for the South Bend Urban Area.
3. Prior to the start of the design for any facility listed in paragraph (1) above the Architect, Engineering or Owner should contact the Department of Public Works for information.

SECTION 106 - CONTROL OF MATERIAL - The following sections shall be added:

106.11 COARSE AGGREGATE

1. Unless specifically allowed in the Special Provision gravel will not be used as a coarse aggregate in any finished asphaltic or cement concrete surface exposed to the weather.

106.12 MATERIAL CERTIFICATIONS

1. All material that is to be used in any construction and which has not been approved by the Engineer in writing, will be given approval after certified reports as to the material's composition and compliance with these PREVAILING SPECIFICATIONS have been supplied to the Engineer.
2. These certifications will be required prior to incorporation on any manufactured product into the Project.
3. Aggregate shall be tested and approved by the Engineer prior to its incorporation into base, subbase, asphalt, cement concrete or shoulder work.

SECTION 109 - MEASUREMENT AND PAYMENT

109.08 STATE SECTION 109.08 DELETE THIS SECTION IN ITS ENTIRETY

AND THE FOLLOWING SECTION 109.08 SHALL BE SUBSTITUTED:

109.08 FINAL PAYMENT

1. When the Contractor has completed the work in accordance with the terms of the Contract and the statutory requirements of IC 36-1-12, et seq., the Construction Manager, or duly authorized representative, will prepare a final estimate for the work done, one copy of the Completion Affidavit, one copy of the waiver of lien, and the necessary payment claims and deliver them to the Contractor for final payment
2. Upon execution of the affidavit and claim forms and delivery of same to the Construction Manager by the Contractor, the Construction Manager will present them to the Board of Public Works for final payment.
3. One copy of the affidavit will be returned to the Contractor.

ADD SECTION 217 - RETENTION BASINS

1. Before any outfall pipes are connected to a new retention basin they must meet the following standard(s).

- a. Filter measures, such as sediment basins, at every new outfall must be put in place and maintained throughout construction of the watershed service area.
- b. Filter measures, as part of the drainage plan, are to be approved by the City Engineer before any outfalls are placed.

217.1 MATERIALS

1. If no seed mixtures are explicitly specified on the plans or in the contract documents or a contractor is performing permitted work on an existing basin the following seed mixtures shall be used and placed as specified:
 - a. Perennial and Annual Flower Plots.
 - i. Perennial and Annual Flower Plots shall be planted on the banks of retention basins.
 - ii. The only acceptable seed mixture shall be the America Mix manufactured by Rupp Seeds, or equivalent as approved by the City Engineer.
 - b. Food Plots
 - i. Food plots shall be planted in the bottom of retention basins.
 - ii. The only acceptable seed mixture shall be the Upland Mix manufactured by Rupp Seeds, or equivalent as approved by the City Engineer.
 - c. Warm Season Grasses
 - i. Warm season grasses are to be planted around any culverts or inflows into a detention basin to act as erosion control and filter measures.
 - ii. Grass types to be utilized are as follows: Big Bluestem, Little Bluestem, Switch grass, or Indian Grass
 - d. All herbicidal label requirements and applicable state and federal regulations will be followed.

217.2 CONSTRUCTION

1. Note all construction shall conform to the City of South Bend's Rule 13 Erosion Control and Permitting Ordinance.

- a. Soil pH for planting shall be within 6.5 – 7.5. If soil pH is not within the suitable range lime shall be applied according to test recommendations until the pH is within the acceptable range.
- b. Before seeding occurs 200 lbs. per acre of 12-12-12 fertilizer shall be applied to the site.
- c. Seeds shall be applied at a rate specified by the manufacturer.

217.3 MAINTENANCE

1. Seedbeds are to be maintained until vegetation is established.
2. This includes periodic watering and reseeded.
3. After this requirement has been met, based upon the approval of the City Engineer, the contract requirements shall be considered fulfilled.

SECTION 300 - AGGREGATE PAVEMENT AND BASES

ADD 302.02 MATERIALS

1. The natural soil in place may qualify as SUBBASE when the following conditions are met:
 - a. Borings -A soil boring at intervals not to exceed 200 lineal feet is taken within the limits of construction. The boring shall extend 3 feet below the natural ground.
 - b. Gradation -The soil sample shall be screened for compliance with one of the gradations tabulated in 903.04. For the determination of the material passing the Size No. 200 sieve, the sample shall be thoroughly washed and the amount of Loss through Decantation shall be determined. The final gradation of the materials shall comply with the requirements as set forth in 903.04 (b).
 - c. Analysis – The analysis of the existing material shall be submitted to the Engineer with the signature and seal of a Registered Professional Engineer. The final determination for use of the material as SUBBASE shall be made by the Engineer.

303.03 PREPARATION OF SUBGRADE

1. If the soil on site meets the standards for subbase as set forth by 302.02, the requirements of INDOT Section 207 shall not apply.

SECTION 402 - HOT MIX ASPHALT, HMA, PAVEMENT

Section 402 shall be deleted in its entirety and replaced by the following specification:

1. Prevailing Specifications:
 - a. 2008, INDOT, Standard Specifications Sections 401, 402 and 406
2. Additions:
 - a. The Contractor shall submit a job mix formula for approval five (5) working days prior to any mix placed.
 - i. The Contractor will not be allowed to proceed with the placement of asphalt without an approved job mix formula.
 - ii. The Contractor shall notify the city forty eight (48) hours prior to placing any asphalt.
 - iii. Mix placed without notification will be subject to no payment to the Contractor.
 - b. The Contractor shall hire an outside-approved independent laboratory to perform testing.
 - i. Test results shall be given to the city representative within forty eight (48) hours.
 - ii. A city representative shall be present and designate a random location for all samples.
 - iii. A representative from the testing lab will be present during sampling and shall take immediate possession of sample(s).
 - iv. The representative from the testing lab will be required to sign the City's chain of custody form prior to leaving the site with the samples.
 - c. One (1) plate sample for each different type of mix shall be taken each day that fifty (50) tons are placed.
 - i. If more than five hundred (500) tons per day are placed, then one (1) additional sample for each five hundred (500) tons will be required for each different type of mix.

- d. There shall be a minimum of two (2) field density tests for each mix design and each lift.
 - i. An outside approved independent laboratory shall perform density testing.
 - ii. The target density shall not be less than ninety six (96%) percent of the optimum unit weight of the mixture at the optimum binder content, as determined during the preparation of the mix design.
 - iii. The determination of optimum density shall be the average of five (5) tests taken at random locations.
 - iv. When the width of the pavement does not allow tests to be taken transversely, the five (5) tests shall be taken longitudinally.
 - v. The average of the density tests should not be less than ninety five (95%) percent of the average density of six (6) laboratory prepared specimens.
- e. If test results for the mixture properties, and density, does not meet allowable tolerances, adjustment points shall be assessed in accordance with Section 401.19 of the 2006 INDOT Standard Specifications.
- f. The Contractor shall perform smoothness tests for all base, intermediate, and surface pavements in accordance with 2006 INDOT Standard Specification Section 401.19.
 - i. The test shall be done in the presence of a city representative. The Contractor shall straight edge each course prior to the placement of the next course.
 - ii. Adjustment in payment factors for smoothness shall be assessed in accordance with Section 401.19 of the 2008 INDOT Standard Specifications.
- g. Damages will be assessed if the Contractor varies from the above specification.
- h. No recycled asphalt pavement (RAP) or Native gravel for coarse aggregate will be allowed in the HMA surface mixture.
 - i. The binder in the HMA surface mix shall be PG 70-22.

SECTION 500 - CONCRETE PAVEMENT

502.02 MATERIALS

1. Change the following:
 - a. Course Aggregate shall only be Class AP, Size No.5 unless otherwise specified.
 - b. No payment shall be made for Concrete Pavement that deviates from this Coarse Aggregate Requirement.

SECTION 807 - HIGHWAY ILLUMINATION

807.20 CITY OF SOUTH BEND, IN SPECIFICATIONS

1. Drawings :
 - a. Prior to the installation of street lights in a development , the developer must submit three (3) sets of plans for review and approval
 - i. These plans must meet minimum design standards as described in the standards set forth herein and the standards set forth below.
2. Points of Service :
 - a. American Electric Power shall specify all points of service for the street lighting system.
3. As-Built Drawings & Catalog Cuts
 - a. Upon completion and prior to acceptance of the street light system, the developer must submit three sets of as built drawings of the street light system, along with three sets of catalog cuts on all material used in the installation of the lighting system to the City of South Bend Engineering Department.
4. Minimum Design Standards:
 - a. The following are minimum design standards for street lights installed within the City of South Bend:
 - i. Woodpole -overhead wiring
 - (a) Maximum spacing -200 ft.
 - (b) Either staggered or one side

- (c) Wire -#4 duplex, aluminum
 - (d) Connection Wire -#12 alum (black and white) 600V
 - (e) Fixture -GE Cobra Head 200W HPS 120 Volt M-400 Series
 - (f) Arm -6' arm x 2' with 2' rise (aluminum)
 - (g) Photo control relay service -30 or 60 AMP normally open
- ii. Fiberglass Pole -Underground wiring
- (a) Pole -Fiberglass 17' overall height, 14' aboveground
 - (b) MFG -Shakespeare
 - (c) Engineered Fiberglass Products, Inc., or equal
 - (d) Maximum spacing -50 ft, staggered
 - (e) Color -Black
 - (f) Fixture - GE TC-100 100W HPS, 120V or
 - (g) ITT American Revolution 100W HPS, 120V
 - (h) Wire -#4 slum direct bury
 - (i) Pole wire -#12 alum., 600V (black + white) THHN
 - (j) Photo control relay service -30 60 AMP normally open
- iii. Aluminum pole -underground wiring
- (a) Pole -35' aluminum direct bury with 6' arm
 - (b) Fixture -GE Cobra head 200 W. HPS, 120V -M-400 Series
 - (c) Max. spacing -200 ft. staggered or one side
 - (d) Wire -#4 alum direct bury
 - (e) Pole wire -#12 alum, 600V (black & white) THHN
 - (f) Photo control relay services -30 or 60 AMP nominally open

- (g) No variance from these standards will be permitted without written approval by the City Engineer.

SECTION 910-METAL MATERIALS

910.14 (a) FLANGED CHANNEL POSTS

- 1. **ADD** Street Name Posts
 - a. 2 lb per foot, 10 foot minimum length
- 2. **ADD** Traffic Control Posts
 - a. 2 lb per foot, 12 foot minimum length
- 3. **ADD** Delineator Posts
 - a. 3 lb. per foot, 7 foot minimum length

SECTION 919 TRAFFIC SIGNS

- 1. **ADD** All Street signs shall be metal.
 - a. No plywood signs shall be allowed.
- 2. **ADD** All Signs shall also conform to the MUTCD, most recent version.

SECTION 2000 - STREET EXCAVATION AND REPAIR

2000.01 AUTHORITY

- 1. Chapter 18, Article 2, Division 2 Municipal Code, City of South Bend, Indiana

2000.02 DESCRIPTIONS

- 1. Policy
 - a. Whereas: The Board of Public Works deems it necessary to establish a firm policy for the backfilling of excavations and opening or excavations and replacement of pavement disturbed as a result of making an opening or excavation on any street, these specifications are set forth and the compliance therewith shall be a requirement of obtaining a permit for said opening or excavation under chapter 18, Article 2, Excavations, as set

forth in the South Bend Municipal Code.

- b. It shall be the obligation of any person, firm or corporation obtaining a permit for an opening or excavation in the public right-of-way to backfill the excavation and replace the pavement as set forth in these specifications:

2. Backfill

- a. All excavations under pavement shall be backfilled with material meeting INDOT Section 211.03.1 Types 2, 3, or 4.
- b. Any flowable backfill used in place of traditional backfill shall meet INDOT Section 213, Removable Flowable Backfill .
- c. Compaction shall meet the requirements of INDOT 211.04.

3. Pavement Replacement

- a. All pavement shall be replaced with a type of construction equal to or better than that which is removed, as approved in writing by the City Engineer.
- b. All concrete pavement removal shall be to the nearest joint.
- c. Joints in concrete replacement pavement shall match the existing joints in the pavement

4. Concrete or Asphalt Pavements

- a. Concrete or asphaltic pavement shall be replaced with concrete of a thickness equal to that which existed or six (6) inches, whichever is greater.
 - i. Concrete used in pavement replacement shall consist of Type A concrete with 6% air entrainment.
 - ii. Slump shall not exceed four (4) inches.
- b. Coarse Aggregate shall be Limestone or Blast Furnace Slag ONLY. No natural or local gravel aggregate may be used.
- c. When concrete is used in replacement of asphaltic pavement, a blacking agent such as C 250 Super Black (Color Pigment, Inc.) or approved equal, shall be used.
- d. Tining shall be performed immediately after. A clear seal membrane shall be utilized once patch is finished (asphalt only).

- e. White pigment will be only accepted seal for any concrete work performed in an existing concrete street.
5. Brick Pavement
- a. When excavating brick pavement, the existing brick shall be removed and stockpiled, prior to excavation. Said brick shall be used for pavement replacement.
6. Temporary Patch
- a. If it is not possible, due to weather conditions, for the contractor to replace the pavement within 24 hours following backfilling of cut, a coarse aggregate base 8" thick and a cold asphaltic surface of 4" shall be applied and maintained as a temporary patch until permanent repairs can be made.
 - b. Cold weather concrete shall be used and blanketed when the temperature falls below 50 degrees.
 - c. Such temporary patches shall be replaced with permanent repairs no later than May 1 of the following year.
 - d. The permit holder will be responsible for maintaining the temporary patch until final surface restoration is made.

2000.03 TRAFFIC CONTROL

- 1. It shall be the responsibility of any person, firm, or corporation to provide all traffic control devices and personnel required by the Indiana Manual for Uniform Traffic Control Devices at no direct cost to the City.
- 2. No construction equipment, including vehicles, trailers, or other objects shall be left unattended in the right-of-way of any street or parked overnight without proper markings and lighting.
- 3. The method of traffic control shall be approved by the Engineer.
- 4. It shall be the responsibility of any person, firm, or corporation to provide flag persons whenever operations require traffic to be reduced to one lane for travel.

2000.04 INSPECTION

- 1. It shall be the responsibility of any person, firm, or corporation to notify the Engineer when obtaining curb cut / excavation permits from the Engineering Department as to the time and date of the proposed work.

- a. If the reported date is altered, it shall be the responsibility of the permit holder to notify the Engineer no less than 24 hours prior to the commencement of the proposed work.
2. The Engineer reserves the right to reject any and all work upon the failure by the Contractor to comply with this section.

SECTION 2001 - SEWERS & RELATED FACILITIES

2001.01 DESCRIPTION

1. This work shall consist of the design and construction of storm and sanitary sewers and related facilities.
2. Special attention shall be given to the STATE SPECIFICATIONS as this Section 2001 pertains only to special items not covered in the STATE SPECIFICATION.

2001.02 DESIGN REQUIREMENTS - SEWAGE FACILITIES

1. All storm and sanitary sewers, sewage pumping stations, and sewage treatment facilities shall be designed in accordance with the latest revision of "Recommended Standards for Sewage Works" as adopted by the Great Lakes-Upper Mississippi River Board of State Sanitary Engineers.

2001.03 DESIGN REQUIREMENTS - ROOF AND PAVED AREA

1. Drainage and Maintenance – Off street parking facilities shall be graded so as to prevent drainage onto abutting property and/or into the public streets and alleys.
2. Dry wells of a construction capacity and design approved by the City Civil Engineer shall be installed to collect all runoff water unless adequate storm sewers or drainage ditches are available.
3. Dry wells shall be cleaned periodically so that they will collect the design capacity of runoff water.
4. These drainage provisions shall not apply where a different method disposing of said runoff water is ordered by the Board of Public Works.
5. Parking areas shall be maintained in a clean and orderly condition at the expense of the owner or lessee and not to be used for the sale, repair, or dismantling or servicing of any vehicles, equipment, material or supplies.
6. No newly constructed, rebuilt, repaired, or replaced gutter, downspout, roof drain, foundation drain or off-street parking area drain shall be connected with or permitted to drain into the sanitary sewer system of the City.

2001.04 DESIGN REQUIREMENTS - STORM SEWER CRITERIA

1. All storm sewer facilities shall be designed in accordance with latest Standards Drawings as approved by the Board of Public Works. However, the City Engineer may require the use of more stringent criteria where he/she deems it appropriate.

2001.05 PIPE MATERIALS

1. All sewers shall be constructed of the materials as approved by the Engineer.

2001.06 JOINT MATERIALS

1. Sanitary Sewers
 - a. All joints for sanitary sewer pipe shall meet all requirements of the latest revision of the "Recommended Standards for Sewage Works" otherwise known as the "10 State Standards".
2. Riser/Adjusting Rings
 - a. NO BRICK OR BLOCK SHALL BE USED IN THE CONSTRUCTION OF A MANHOLE OR TO ADJUST THE ELEVATION OF THE FRAME AND COVER.
 - b. CONTRACTOR shall replace existing, deteriorated riser with new precast concrete riser rings free from cracks, voids and other defects conforming to ASTM C478 or a "Pivoted Turnbuckle Manhole Riser" as manufactured by American Highway Products, or approved equal.
 - c. To the extent practicable, CONTRACTOR shall use riser rings of a nominal thickness of not less than two (2) inches and not more than twelve (12) inches for reconstruction and/or adjustment of the manhole frame and cover.
 - i. Where the ring thickness of any individually installed replacement ring is less than 2 inches CONTRACTOR shall use high density polyethylene riser rings exclusively.
 - ii. CONTRACTOR shall adjust all manholes designated to receive casting adjustment and/or alignment.
 - iii. Such adjustment shall meet existing finished grade unless an alternative elevation is specified.
 - iv. Where existing structures are located in sloped, paved surfaces, CONTRACTOR shall use high density polyethylene riser rings

with slope construction exclusively.

- d. Extrudable Preformed Gasket Material:
 - i. CONTRACTOR shall use a nominal 1/2 inch size butyl rubber base gasket material, conforming to AASHTO M-198 and Federal Specification SS-S-210A placed in all keyways as shown in Figures 5.4A and B between precast concrete adjusting ring and casting, individual precast concrete adjusting rings, and precast concrete adjusting ring and conejoints.
 - ii. The gasket material shall be as manufactured by Hamilton Kent-Seal, RUB=R-NEK-L-T-M by K.T. Snyder Company or an OWNER approved equal.
 - iii. CONTRACTOR shall use a double bead of 3/16 inch to 3 inch butyl sealant on high density polyethylene riser rings as specified.
- e. Preparation:
 - i. CONTRACTOR shall excavate and remove the existing riser rings where riser reconstruction is designated or otherwise required to provide a suitable base for casting reinstallation.
 - ii. CONTRACTOR shall thoroughly clean the concrete cone or top slab with a whisk broom, wire brush, chisel or other method to assure a flat seating surface free of rocks, gravel, asphalt, protruding concrete, dirt, frozen and other material and debris.
 - iii. For significantly damaged cone tops and top slabs, CONTRACTOR shall apply rapid setting cement mortar to a smooth finish suitable for seating riser rings, and install the riser rings in accordance with the manufacturer's recommendations.
- f. Precast Concrete Riser Ring Sealant
 - i. CONTRACTOR shall provide a watertight seal between the cone and precast concrete riser ring, each adjoining precast concrete riser ring, and precast concrete riser ring and casting by applying two (2) rows of 1/2 inch extrudable preformed gasket material.
 - ii. A compatible primer or solvent as recommended by manufacturer of butyl base material shall be used to prepare surfaces prior to application of butyl base material and riser rings.
- g. Precast Concrete Riser Ring Sealant

- i. CONTRACTOR shall provide a watertight seal between the cone and precast concrete riser ring, each adjoining precast concrete riser ring, and precast concrete riser ring and casting by applying two (2) rows of 1/2 inch extrudable preformed gasket material.
- 11. A compatible primer or solvent as recommended by manufacturer of butyl base material shall be used to prepare surfaces prior to application of butyl base material and riser rings.
- h. HDPE Riser Ring Sealant
 - i. CONTRACTOR shall apply a 3/16 inch to 3 bead of butyl sealant on the cone or top slab of the existing structure.
 - ii. A double bead shall be used if surface irregularities are present.
 - iii. CONTRACTOR shall also apply a 3/16 inch to 3 inch bead of butyl sealant on the bottom of each HDPE riser at the male lip, and a 3/16 inch to 3 inch bead of sealant on the top of the last ring prior to resetting the existing casting.
- i. Exterior Sealing
 - i. CONTRACTOR shall reinstall existing casting or provide new casting as applicable; and prior to backfilling, shall seal the exterior of the manhole from two (2) inches below the bottom riser ring on the cone section to and covering the base of the casting, including the voids on the outside joints of the riser rings with a trowelable grade butyl rubber base exterior backplaster material, 3 inch minimum thickness when dry.
 - ii. CONTRACTOR shall then apply a shrink wrap, visquine, or OWNER approved equal to the outside of the riser rings to provide further sealing of the manhole.
 - iii. As an alternative, CONTRACTOR shall install Infi-Shield External Sealing System or OWNER approved equal.
- 3. Testing and Acceptance
 - a. All work shall be visually inspected by ENGINEER prior to backfilling and at the time of final inspection.
 - b. Any defects shall be repair by CONTRACTOR at no additional cost to OWNER. See 2001.08 for specific testing requirements.

2001.07 **APPURTENANCES**

1. Manholes: Manholes are to be in accordance with the Standard Drawings and Plans.
2. Special attention shall be given to the infiltration and exfiltration requirements in Section 2001.06 as no allowance will be made for leakage in the manholes.
3. Inlet and Inlet Pipes: Inlets are to be in accordance with the Standard Drawings and Plans. Inlet pipes shall be included in the specifications pertaining to Storm Sewers.
4. Miscellaneous Items: All other items pertinent to the Project shall be covered in the Standard Drawings and Plans.

2001.08 TESTING MATERIAL

1. All manufactured material used in the Project shall meet all testing requirements of these PREVAILING SPECIFICATIONS. Special attention shall be given to Section 106.
2. Infiltration and exfiltration tests shall be responsibility of the Contractor. In the event of failure, the Contractor shall be fully responsible for correction of the problem and retesting by the Engineer.
3. Certification of materials does not preclude further testing by the Engineer.
4. All manholes, unless otherwise specified, shall be tested with negative air pressure (vacuum) in accordance with ASTM C-1244-93
5. The Engineer reserves the right to reject any materials which do not fulfill these SPECIFICATIONS.

2001.09 INSPECTION

1. It shall be the responsibility of the Contractor to notify the Engineer of his intent to commence working operations. Said notice shall be issued no less than 48 hours prior to start.
2. The Engineer reserves the right to reject all work based upon the failure by the Contractor to comply with this Section.
3. A five (5%) percent Mandrel Deflection Test shall be performed on all flexible sewer pipe.
 - a. These pipes shall be mandrelled with a rigid device sized to pass five (5%) percent or less deflection (or deformation) of the base inside diameter of the pipe

- b. The mandrel test shall be conducted thirty (30) days after reaching final trench backfill grade. Each pipe material/type required to be mandrel tested shall be tested with a mandrel approved by the pipe manufacturer and meeting the requirements of this section.
 - c. The test shall not be performed with the aid of a mechanical pulling device.
 - d. The mandrel shall be pulled by hand through all sewer lines in a manner acceptable to the City Engineer and any section of sewer not passing the mandrel shall be uncovered, replaced or repaired to the City's satisfaction, and retested.
 - e. The Contractor shall provide proving rings to check the mandrel.
 - f. Drawings of mandrels with complete dimensions shall be furnished by the Contractor to the City upon request for each diameter and specification of pipe.
4. Leakage tests of the sewer and manholes shall be conducted by the Contractor for infiltration or exfiltration.
 - a. The infiltration and exfiltration shall not exceed two hundred (200) gallons per inch diameter per mile per day for any section of the system.
 - b. The tests shall be performed with a minimum positive head of two (2') feet.
 5. For Pipes thirty-six (36) inches and larger in diameter ASTM C-1103 joint test will be allowed.
 6. For elliptical pipes video inspection of each joint will be allowed instead of air or joint testing.
 7. Vacuum testing of the standard manholes will be required while manholes of special configuration will be exempt from testing on this project.
 8. If an air test is proposed, the test must be approved by the City Engineer.
 9. Tests must be certified by a professional engineer registered in the State of Indiana.
 10. The City Engineering Department shall be advised forty-eight (48) hours prior to conducting all tests.

2001.10 GENERAL REQUIREMENTS

1. Special attention shall be given to the PREYAILING SPECIFICATIONS covering the several items of responsibility, backfilling and final acceptance of the work.

SECTION 2003 - PRIVATE IMPROVEMENTS

2003.01 DESCRIPTION

1. Procedure
 - a. This Section outlines the proper procedure for approval, construction, dedication, and acceptance of storm sewers, sanitary sewers, roads, curbs, sidewalks, drainage and other related improvements constructed by Developers for dedication to the civil City of South Bend as Public right of way.

2003.02 PRIVATE IMPROVEMENTS IN UNDEDICATED AREAS

1. Initial Approval
 - a. The Developer must submit to the Board of Public Works all Final Plans and Specifications related to the proposed Improvements.
 - b. All Plans shall be prepared and sealed by a Professional Engineer registered in the State of Indiana.
 - c. Accompanying these documents and request for approval, the Developer shall furnish the Board of Public Works proof of final plat approval as issued by the appropriate agency.
 - d. Construction activities shall not begin unless all Plans, Specifications and related documents are approved by the Board of Public Works. Any work completed prior to approval by the Board of Public Works may be required to be removed and replaced at the Board's or its authorized representative's discretion.
 - e. If the work is not accepted or replaced by the Developer the surety held by the Board will be used to have the improvements re-installed by a licensed and bonded contractor.
 - f. Surety shall be posted in perpetuity until the acceptance of the Completion Affidavit, Maintenance Bond, and Waiver of Lien.
 - g. Surety may be reduced as improvements are accepted by the Board of Public Works. (see "D" Below)
2. Construction Phase

- a. Control of Work: All work shall be done in accordance with these Special Provisions and the Prevailing Specifications.
 - b. Notification to Engineers: Section 2001.09 (a) shall apply
3. Acceptance of Improvements
- a. Upon completion of work:
 - i. The Developer shall request Final Inspection and acceptance by the Engineer
 - ii. The Developer shall submit the following documents to the Board of Public Works along with his request for acceptance of the Improvements.
 - b. As Built Plans: The as-built plans shall be in accordance with section 2090.
 - c. Waiver of Lien: On all workmanship and materials used in connection with these improvements.
 - d. Maintenance Bond , as per section 103.04
 - e. Completion Affidavit, as furnished by the Board of Public Works
 - f. Items 3 and 4 above shall list the Developer as the 1st party to all documents. Maintenance Bonds and Completion Affidavits will not be accepted from individual contractors or service firms.
4. Uncompleted Work
- a. Should acceptance by the Board of Public Works be requested by the Private Party prior to the completion of all improvements , a Modified Completion Affidavit may be issued at the discretion of the Engineer, if the following conditions are met:
 1. Posting with the Board of Public Works one of the following items to insure completion of the balance of all Improvements:
 - (a) Certified Letter of Credit
 - (b) Certified Check
 - (c) Any equally negotiable instrument equal to (a) or (b),
 - (d) All such instruments in the amount of 100% of the

uncompleted improvements.

- (e) The instrument shall be issued in perpetuity and shall NOT have an expiration date.
- (g) It will be released upon final acceptance of the proposed improvements.

2003.03 PRIVATE IMPROVEMENTS IN DEDICATED AREAS

1. Initial Approval: As per Section 2002.02(A)
2. All reference to final plat approval shall be deleted.
3. The following Provisions shall be added:
 - a. It shall be the responsibility of the Developer (or his authorized agent) to secure all required permits.
 - b. The Developer shall submit a document acceptable to the Board of Public Works stating their intent to dedicate any additional right-of-way or easements as required by the proposed Plans and Specifications.
4. Construction Phase
 - a. The following provisions shall be added:
 - i. The Developer shall also furnish to the Board of Public Works documentation of Grants of Right-of -way and *I* or Easements necessitated by any improvements constructed outside the existing right-of-way and *I* or Easements.
 - ii. All such documentation shall be furnished on forms approved by the Board of Public Works.

SECTION 2090 - AS-BUILT PLAN REQUIREMENTS

2090.01 ALL As-Built plans shall meet the following requirements:

1. Deviations from the original construction drawings shall be shown in the same general detail utilized in the original drawings.
2. For Public Work a copy of the plans shall be continuously updated (hand marked) on-site as construction proceeds and available for inspection by the City of South Bend Board of Public Works or their authorized representative.

3. If any significant changes, as deemed so by the City of South Bend or its authorized representative, are made to the plans during construction the as-built drawings shall be re-drafted to reflect the change(s).
4. Only computer generated corrections will be accepted on the final sets (electronic and hard-copy) of as-built drawings. No handwritten strike-outs or corrections will be accepted.
5. The final set of as-built drawings shall be clearly stamped "AS-BUILT" and dated with the date of production. They shall also be stamped and certified by a professional engineer or professional land surveyor.
6. The City reserves the right to utilize some or all of the retainage held for a public project or a portion of the posted surety to complete as-built drawings if they are not submitted within twenty-one (21) calendar days of the substantial completion date of a project.
7. No retainage will be released or full surety will not be released until the as-built drawings are approved.
8. Final hard copy as-built drawing requirements :
 - a. One (1) set of as-built drawings shall be submitted on D size (24" x 36") mylar or vellum.
 - b. As-built drawings are to be submitted in black and white only as a complete set consisting of EVERY sheet of the original plan set.
9. Electronic as-built requirements:
 - a. One (1) set of as-built drawings shall be submitted in AutoCAD (2000 or later versions only) .DWG file format.
 - b. As-built drawing format shall meet all requirements set forth in drawing A-3 of the City of South Bend's Design and Construction Standards.

SECTION 2100 EXCAVATION & TRENCHING SAFETY

1. Purpose
 - a. This program outlines procedures and guidelines for the protection of employees working in and around excavations and trenches.
 - b. This program requires compliance with OSHA Standards described in Subpart P (CFR 1926.650) for the construction industry.

- c. Compliance is mandatory to ensure employee protection when working in or around excavations.
 - d. The programs in this manual on confined space, hazard communication, lock-out/tag-out, respiratory protection, and any other safety programs or procedures deemed essential for employee protection, are to be used in conjunction with this program.
2. Scope
- a. This program pertains to all City of South Bend projects that require any excavations or trenches.
 - b. Please direct any questions to the Safety and Risk Department (574) 245-6400.
3. References
- a. 29 CFR 1926.650, Subpart P -Excavations
 - b. Excavation Equipment Manufacturer Safety Procedures
4. Responsibilities
- a. It is the responsibility of each supervisor or department head to implement and maintain the procedures and steps set forth in this program.
 - b. Each employee involved with excavation and trenching work is responsible to comply with all applicable safety procedures and requirements of this program.
5. Definitions
- a. BENCHING -A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near vertical surfaces between levels.
 - b. CAVE-IN – The separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by failing or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.
 - c. COMPETENT PERSON -One who is capable of identifying existing and predictable hazards in the surroundings or working conditions, which are

unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

- d. DURATION OF EXPOSURE – The longer an excavation is open, the longer the other factors have to work on causing it to collapse.
- e. EXCAVATION -Any man-made cut, trench, or depression in an earth surface, formed by **earth** removal.

6. Hazardous Atmosphere

- a. An atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

7. Protective System

- a. A method of protecting employees from cave-ins, from material that could fall or roll from an excavation, or from the collapse of adjacent structures.
- b. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide necessary protection.

8. Shield

- a. A structure that is capable of withstanding the forces imposed on it by a cave-in and thereby protects employees within the structure.
- b. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. All shields must be in accordance with 29 CFR 1926.652(c)3 or (c)4.

9. Sloping

- a. A method of protecting workers from cave-ins by excavating to form sides of an excavation that is inclined away from the excavation to prevent cave-ins.
- b. The angle of incline required to prevent a cave-in varies with differences such as soil type, length of exposure, and application of surcharge loads.

10. Surcharge Loads

- a. Generated by the weight of anything in proximity to the excavation, push starts for a cave-in (anything up top pushing down). Common

surcharge loads:

- i. Weight of spoil pile
- ii. Weight of nearby buildings, poles, pavement, or other structural objects.
- iii. Weight of material and equipment

11. Trench

- a. A narrow excavation below the surface of the ground, less than 15 feet wide, with a depth no greater than the width.

12. Undermining

- a. Undermining can be caused by such things as leaking, leaching, caving or over-digging. Undermined walls can be very dangerous.

13. Vibration

- a. A force that is present on construction sites and must be considered. The vibrations caused by backhoes, dump trucks, compactors and traffic on job sites can be substantial.

14. Excavation

- a. Before any work is performed and before any employees enter the excavation, a number of items must be checked and insured:
- b. Before any excavation, underground installations must be determined.
 - i. This can be accomplished by either contacting the local utility companies or the local "one-call" center for the area.
 - ii. All underground utility locations must be documented on the proper forms.
 - iii. All overhead hazards (surface encumbrances) that create a hazard to employees must be removed or supported to eliminate the hazard.
 - iv. If the excavation is to be over 20 feet deep, it must be designed by a registered professional engineer who is registered in the state where work will be performed.

- v. Adequate protective systems will be utilized to protect employees. This can be accomplished through sloping, shoring, or shielding.
 - c. The worksite must be analyzed in order to design adequate protection systems and prevent cave-ins.
 - i. There must also be an excavation safety plan developed to protect employees.
 - d. Workers must be supplied with and wear any personal protective equipment deemed necessary to assure their protection.
 - i. All spoil piles will be stored a minimum of four (4) feet from the sides of the excavation.
 - ii. The spoil pile must not block the safe means of egress.
 - e. If a trench or excavation is 4 feet or deeper, stairways, ramps, or ladders will be used as a safe means of access and egress.
 - i. For trenches, the employee must not have to travel any more than 25 feet of lateral travel to reach the stairway, ramp, or ladder.
 - ii. No employee will work in an excavation where water is accumulating unless adequate measures are used to protect the employees.
 - f. A competent person will inspect all excavations and trenches daily, prior to employee exposure or entry, and after any rainfall, soil change, or any other time needed during the shift.
 - i. The competent person must take prompt measures to eliminate any and all hazards.
 - g. Excavations and trenches 4 feet or deeper that have the potential for toxic substances or hazardous atmospheres will be tested at least daily.
 - h. If the atmosphere is inadequate, protective systems will be utilized.
 - i. If work is in or around traffic, employees must be supplied with and wear a wrap around reflective (vertical or horizontal) vests.
 - i. Signs and barricades must be utilized to ensure the safety of employees, vehicular traffic, and pedestrians.
15. Competent Person Responsibilities

- a. The OSHA Standards require that the competent person must be capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and have authorization to take prompt corrective measures to eliminate them and, if necessary, to stop the work.
- b. A competent person is required to:
 - i. Have a complete understanding of the applicable safety standards and any other data provided.
 - ii. Assure the proper locations of underground installations or utilities, and that the proper utility companies have been contacted.
 - iii. Conduct soil classification tests and reclassify soil after any condition changes.
 - iv. Determine adequate protective systems (sloping, shoring, or shielding systems) for employee protection.
 - v. Conduct all air monitoring for potential hazardous atmospheres.
 - vi. Conduct daily and periodic inspections of excavations and trenches.
 - vii. Approve design of structural ramps, if used.

16. Excavation Safety Plan

- a. An excavation safety plan is required in written form.
 - i. This plan is to be developed to the level necessary to insure complete compliance with the OSHA Excavation Safety Standard and state and local safety standards.
- b. Excavation safety plan factors:
 - l. Utilization of the local one-call system
 - ll. Determination of locations of all underground utilities
 - m. Consideration of confined space atmosphere potential
 - IV. Proper soil protection systems and personal protective equipment and clothing

- v. Determination of soil composition and classification
 - vi. Determination of surface and subsurface water
 - vii. Depth of excavation and length of time it will remain open
 - viii. Proper adherence to all OSHA Standards, this excavation and trenching safety program, and any other coinciding safety programs.
- c. The competent person will classify the soil type in accordance with the definitions in Appendix A on the basis of at least one visual and one manual analysis.
- i. These tests should be run on freshly excavated samples from the excavation and are designed to determine stability based on a number of criteria: the cohesiveness, the presence of fissures, the presence and amount of water, the unconfined compressive strength, the duration of exposure, undermining, and the presence of layering, prior excavation and vibration.
 - ii. The cohesion tests are based on methods to determine the presence of clay.
 - (a) Clay, silt, and sand are size classifications, with clay being the smallest sized particles, silt intermediate and sand the largest.
 - (b) Clay minerals exhibit good cohesion and plasticity (can be molded).
 - (c) Sand exhibits no elasticity and virtually no cohesion unless surface wetting is present.
 - (d) The degree of cohesiveness and plasticity depend on the amounts of all three types and water.
- d. When examining the soil, three questions must be asked:
- i. Is the sample granular or cohesive?
 - ii. Fissured or non-fissured?
 - iii. What is the unconfined compressive strength measured in TSP?

17. Methods of Testing Soils:

a. Visual Test

- i. If the excavated soil is in clumps, it is cohesive.
- ii. If it breaks up easily, not staying in clumps, it is granular.

b. Wet Manual Test:

- i. Wet your fingers and work the soil between them.
- ii. Clay is a slick paste when wet, meaning it is cohesive.
- iii. If the clump falls apart in grains, it is granular.

c. Dry Strength Test:

- i. Try to crumble the sample in your hands with your fingers.
- ii. If it crumbles into grains, it is granular.
- iii. Clay will not crumble into grains, only into smaller chunks.

d. Pocket Penetrometer Test:

- i. This instrument is most accurate when soil is nearly saturated.
- ii. This instrument will give unconfined compressive strength in tons per square foot.
- iii. The spring-operated device uses a piston that is pushed into a coil up to a calibration groove.
- iv. An indicator sleeve marks and retains the reading until it is read.
- v. The reading is calibrated in tons per square foot (TSF) or kilograms per cubic centimeter.

e. Thumb Penetration Test:

- i. The competent person attempts to penetrate a fresh sample with thumb pressure.
- iii. If the sample can be dented, but penetrated only with great effort, it is Type A.

iii. If it can be penetrated several inches and molded by light pressure, it is Type C. Type B can be penetrated with effort and molded.

f. Shearvane:

i. Measures the approximate shear strength of saturated cohesive soils.

ii. The blades of the vane are pressed into a fiat section of undisturbed soil, and the knob is turned slowly until soil failure.

ii. The dial is read directly when using the standard vane.

iv. The results will be in tons per square foot or kilograms per cubic centimeter.

v. The competent person will perform several tests of the excavation to obtain consistent, supporting data along its depth and length.

vi. The soil is subject to change several times within the scope of an excavation and the moisture content will vary with weather and job conditions.

vii. The competent person must also determine the level of protection based on what conditions exist at the time of the test, and allow for changing conditions.

18. Soil Classification and Identification

a. The OSHA Standards define soil classifications within the Simplified Soil Classification Systems, which consist of four categories:

i. Stable rock, Type A, Type B, and Type C. Stability is greatest in stable rock and decreases through Type A and B to Type C, which is the least stable. Appendix A of the Standard provides soil mechanics terms and types of field tests used to determine soil classifications.

b. Stable rock is defined as natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

c. Type A soil is defined as:

i. Cohesive soils with an unconfined compressive strength of 1.5 tons per square foot (TSF) or greater.

- ii. Cemented soils like caliche and hardpan are considered Type A.
19. Soil is NOT Type A if:
- a. It is fissured.
 - b. The soil is subject to vibration from heavy traffic, pile driving or similar effects.
 - c. The soil has been previously disturbed.
 - d. The material is subject to other factors that would require it to be classified as a less stable material.
 - e. The exclusions for Type A most generally eliminate it from most construction situations.
20. Type B soil is defined as:
- a. Cohesive soil with an unconfined compressive strength greater than .5 TSF, but less than 1.5 TSF.
 - b. Granular cohesionless soil including angular gravel, silt, silt loam, and sandy loam.
 - c. The soil has been previously disturbed except that soil classified as Type C soil.
 - d. Soil that meets the unconfined compressive strength requirements of Type A soil, but is fissured or subject to vibration.
 - e. Dry rock that is unstable.
21. Type C soil is defined as:
- a. Cohesive soil with an unconfined compressive strength of .5 TSP or less.
 - b. Granular soils including gravel, sand and loamy sand.
 - c. Submerged soil or soil from which water is freely seeping.
 - d. Submerged rock that is not stable.
22. Excavation Protection Systems
- a. The three basic protective systems for excavations and trenches are sloping and benching systems, shoring, and shields.

- b. The protective systems shall have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied to or transmitted to the system.
 - i. Every employee in an excavation shall be protected from cave-ins by an adequate protective system.
- c. Exceptions to using protective system:
 - i. Excavations are made entirely in stable rock
 - ii. Excavations are less than 5 feet deep and declared safe by a competent person

23. Sloping and Benching Systems

- a. There are four options for sloping:
- b. Slope to the angle required by the Standard for Type C, which is the most unstable soil type.
- c. The table provided in Appendix B of the Standard may be used to determine the maximum allowable angle (after determining the soil type).
- d. Tabulated data prepared by a registered professional engineer can be utilized.
- e. A registered professional engineer can design a sloping plan for a specific job.
- f. Sloping and benching systems for excavations five (5) to twenty (20) feet in depth must be constructed under the instruction of a designated competent person.
- g. Sloping and benching systems for excavations greater than twenty (20) feet must be designed and stamped by a registered professional engineer.
- h. Sloping and benching specifications can be found in Appendix B of the OSHA Standard (Subpart P).

24. Shoring Systems

- a. Shoring is another protective system or support system.
- b. Shoring utilizes a framework of vertical members (uprights), horizontal members (whales), and cross braces to support the sides of the excavation

to prevent a cave-in.

- c. Metal hydraulic, mechanical or timber shoring is common examples.
- d. The different examples of shoring are found in the OSHA Standard under these appendices:
 - i. **APPENDIX C** -Timber Shoring for Trenches
 - ii. **APPENDIX D** -Aluminum Hydraulic Shoring for Trenches
 - iii. **APPENDIX E** -Alternatives to Timber Shoring
- e. Shielding is the third method of providing a safe workplace.
 - i. Unlike sloping and shoring, shielding does not prevent a cave-in. Shields are designed to withstand the soil forces caused by a cave-in and protect the employees inside the structure.
 - ii. Most shields consist of two flat, parallel metal walls that are held apart by metal cross braces.
- f. Shielding design and construction is not covered in the OSHA Standards.
 - i. Shields must be certified in design by a registered professional engineer and must have either a registration plate on the shield or registration papers from the manufacturer on file at the jobsite office.
- g. **ANY REPAIRS OR MODIFICATIONS MUST BE APPROVED BY THE MANUFACTURER.**

25. Safety Precautions for Shield Systems

- a. Shields must not have any lateral movement when installed.
- b. Employees will be protected from cave-ins when entering and exiting the shield (examples – ladder within the shield or a properly sloped ramp at the end).
- c. Employees are not allowed in the shield during installation, removal, or during any vertical movement.
- d. Shields can be 2 ft. above the bottom of an excavation if they are designed to resist loads at the full depth and if there are no indications of caving under or behind the shield.

- e. The shield must extend at least 18 inches above the point where proper sloping begins (the height of the shield must be greater than the depth of the excavation).
- f. The open end of the shield must be protected from the exposed excavation wall.
 - i. The wall must be sloped, shored, or shielded.
 - ii. Engineer designed end plates can be mounted on the ends of the shield to prevent cave-ins.

26. Personal Protective Equipment

- a. It is **The City of South Bend's** policy to wear a hard hat, safety glasses, and work boots on the jobsite.
- b. Because of the hazards involved with excavations, other personal protective equipment may be necessary, depending on the potential hazards present (examples -goggles, gloves, and respiratory equipment).

27. Inspections

- a. Daily inspection of excavations, the adjacent areas and protective systems shall be made by the competent person for evidence of a situation that could result *in* a cave-in, indications of failure of protective systems, hazardous atmospheres or other hazardous conditions.
 - i. All inspections shall be conducted by the competent person prior to the start of work and as needed throughout the shift.
 - ii. Inspections will be made after every rainstorm or any other increasing hazard.
 - iii. All documented inspections will be kept on file in the jobsite safety files.

28. Training

- a. The competent person(s) must be trained in accordance with the OSHA Excavation Standard, and all other programs that may apply (examples Hazard Communication, Confined Space, and Respiratory Protection), and must demonstrate a thorough understanding and knowledge of the programs and the hazards associated.
- b. All other employees working in and around the excavation must be trained

in the recognition of hazards associated with trenching and excavating.