CITY OF WARSAW, INDIANA

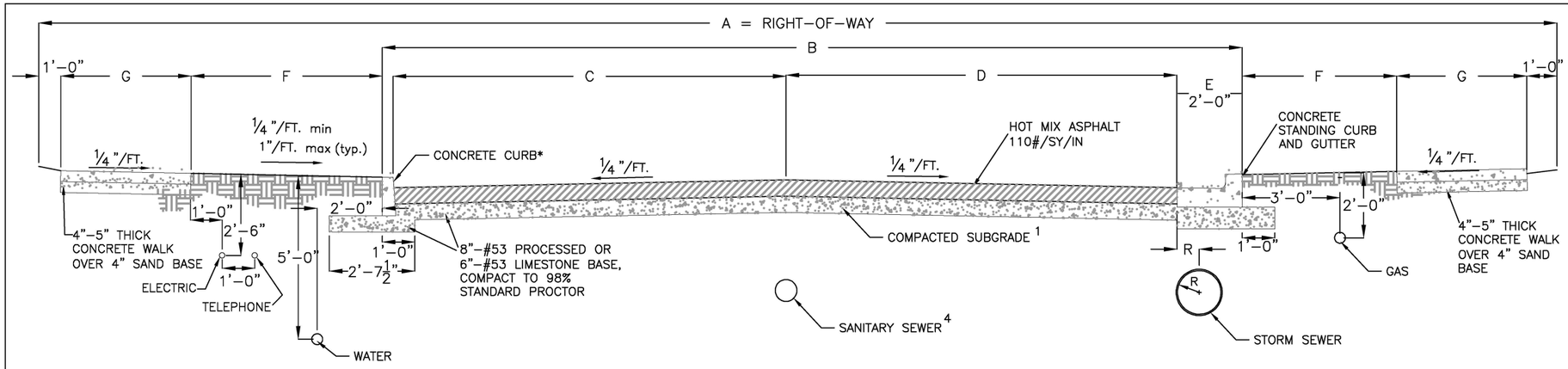
CONSTRUCTION STANDARDS

SHEET	DESCRIPTION
1	STREET SECTIONS
2	STREET SPECIFICATIONS
3	STREET SPECIFICATIONS
4	STREET DETAILS
5	SIDEWALK DETAILS
6	SANITARY SEWER DETAILS
7	SANITARY SEWER SPECIFICATIONS
8	STORM SEWER SPECIFICATIONS
9	STORM SEWER DETAILS
10	PIPE TRENCHING DETAILS

DATE: 12/20/2019

City of Lakes - Since 1854
WARSAW
INDIANA
Living, Working, Playing

JAMES W. EMANS
REGISTERED
No. 880404
STATE OF INDIANA
PROFESSIONAL ENGINEER
James W. Emans



FOR PIPE BEDDING DETAIL,
SEE PAGE 6 OF 8.

STREET CROSS-SECTION

CLASSIFICATION	A	B	C	D	E	F	G	MIN. STREET C/L RADIUS**	MIN. GRADE	MAX. GRADE	MIN. SIGHT DISTANCE	MIN. GUTTER GRADE	MIN. CURB RADIUS
PRINCIPAL ARTERIAL	90'	66'	32.5'	31'	2'	6'	5'	600'	0.5%	5.0%	600'	0.3%	30'
MINOR ARTERIAL	70'	42'	20.5'	19'	2'	8'	5'	500'	0.5%	5.0%	600'	0.3%	25'
COLLECTOR	60'	38'	--	17'	2'	6'	5'	200'	0.5%	6.0%	300'	0.3%	25'
LOCAL	50'	28'	--	12'	2'	6'	5'	100'	0.5%	8.0%	300'	0.3%	25'
ALLEY	16'	12'	--	6'	--	--	--	--	0.5%	8.0%	--	--	20'

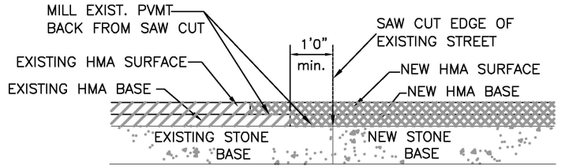
MINIMUM PAVEMENT THICKNESS

CLASSIFICATION	COMP. AGGREGATE BASE	H.M.A.[2] BASE	H.M.A.[2] INTERMEDIATE	H.M.A.[2] SURFACE
PRINCIPAL ARTERIAL	8" PROCESSED OR 6" LIMESTONE	4"	2-1/2"	1-1/2"
MINOR ARTERIAL	8" PROCESSED OR 6" LIMESTONE	4"	2"	1-1/2"
COLLECTOR***	8" PROCESSED OR 6" LIMESTONE	4"	2"	1-1/2"
LOCAL	8" PROCESSED OR 6" LIMESTONE	4"	--	2"
ALLEY	8" PROCESSED OR 6" LIMESTONE	3"	--	1"

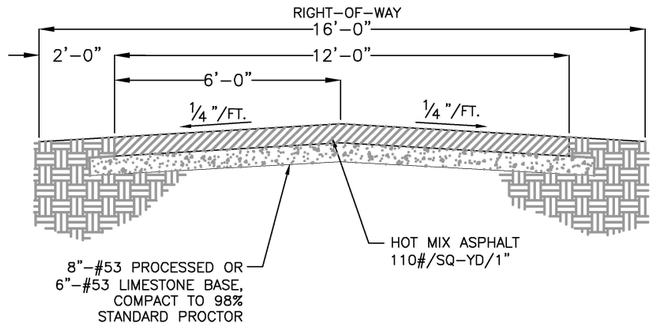
* FOR USE ONLY WITH THE APPROVAL OF THE BOARD OF PUBLIC WORKS AND SAFETY
** A MINIMUM TANGENT OF 100' SHALL SEPARATE ALL REVERSE CURVES
*** MINIMUM ACCEPTABLE PAVEMENT SECTION FOR INDUSTRIAL SUBDIVISIONS

GENERAL NOTES:

1. COMPACTION TEST ARE REQUIRED ON ALL SUBGRADE AND RESULTS TO BE SUBMITTED TO THE SUPERINTENDENT OF PUBLIC WORKS. (SEE SHEET 2 FOR SPECIFICATIONS)
2. H.M.A. = HOT MIX ASPHALT (SEE SHEET 2 FOR SPECIFICATIONS)
3. OTHER PAVEMENT SECTIONS MAY BE CONSIDERED PROVIDED THAT THEY ARE DESIGNED BY AN INDIANA REGISTERED PROFESSIONAL ENGINEER AND ARE BASED ON TRAFFIC NEEDS AND EXISTING SOIL CONDITIONS.
4. THE DEVELOPER/CONTRACTOR SHALL INSTALL ALL SANITARY SEWER SERVICE CONNECTIONS WHEN THE MAIN SANITARY SEWER IS INSTALLED. SAID SERVICE CONNECTION PIPE LINES SHALL BE EXTENDED TO THE STREET RIGHT-OF-WAY,PLUGGED, AND MARKED WITH MARKERS VISIBLE ABOVE GROUND. (SEE SHEET 6 FOR DETAILS)



NEW STREET JOINING EXIST. PVMT.



ALLEY CROSS-SECTION

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CONSTRUCTION STANDARDS
STREET SECTIONS

1

SPECIFICATIONS

1. THE CITY OF WARSAW ENGINEERING STANDARDS SHALL CONSIST OF THE CITY OF WARSAW CONSTRUCTION STANDARDS DRAWINGS AND THE CURRENT ISSUE OF THE INDIANA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS. IN THE EVENT OF ANY CONFLICT BETWEEN THE CITY OF WARSAW STANDARDS AND ANY OTHER DOCUMENT, THE CITY OF WARSAW CONSTRUCTION STANDARDS SHALL PREVAIL.

2. STREETS
   - 2.1. THE ARRANGEMENT, CHARACTER, EXTENT, WIDTH, GRADE AND LOCATION OF ALL STREETS SHALL BE CORRELATED TO THE EXISTING AND PLANNED STREETS, EXISTING TOPOGRAPHY, PUBLIC CONVENIENCE AND SAFETY, AND IN THEIR APPROPRIATE RELATION TO THE PROPOSED USES OF THE LAND TO BE SERVED BY SUCH STREETS. ALL STREETS SHALL BE CONSTRUCTED OF HOT MIX ASPHALT (HMA) OVER A COMPACTED AGGREGATE BASE OVER A PREPARED SUBGRADE.
   - 2.2. HOT MIX ASPHALT PAVEMENT SPECIFICATIONS
     - 2.2.1. ALL ASPHALT PAVEMENTS SHALL BE CONSTRUCTED OF ONE OR MORE COURSES OF HMA BASE, INTERMEDIATE, OR SURFACE IN ACCORDANCE WITH THE CURRENT EDITION OF THE INDIANA DEPARTMENT OF TRANSPORTATION (INDOT) STANDARD SPECIFICATIONS, SECTION 402 WITH THE FOLLOWING EXCEPTIONS
       - 2.2.1.1. MIXTURE DESIGNATIONS: THE MIXTURE TYPE SHALL BE SELECTED USING THE FOLLOWING TABLE.

AADT	<4,000	4,000–30,000	>30,000
402 MIX TYPE	A	B	C

       - 2.2.1.2. SURFACE AGGREGATE TYPE: FOR TYPE A AND B MIXTURES, THE SURFACE AGGREGATE REQUIREMENTS SHALL MEET THE REQUIREMENTS FOR LESS THAN 3,000,000 ESAL* IN 904.03(d). FOR TYPE C MIXTURES, SURFACE AGGREGATES SHALL MEET THE REQUIREMENTS FOR LESS THAN 10,000 ESAL* IN 904.03(d).
       - 2.2.1.3. DENSITY: DENSITY FOR THE MIXTURES SHALL BE CONTROLLED AS FOLLOWS:
         TYPE A 402.15
         TYPE B 401.16* THE PAY FACTORS OF 401.19 DO NOT APPLY
         TYPE C 401.16
       - 2.2.1.4. PG BINDER GRADE: ASPHALT BINDER GRADES ARE LISTED IN THE FOLLOWING TABLE FOR TYPE A, B, AND C MIXTURES.

MIXTURE TYPE	MIXTURE	0% RAP	UP TO 15% RAP	>15% TO 25% RAP
A	SURFACE	64–22	64–22	58–28
	INTERMEDIATE	64–22	64–22	58–28
	BASE	64–22	64–22	58–28
B	SURFACE	64–22	64–22	58–28
	INTERMEDIATE	64–22	64–22	58–28
	BASE	64–22	64–22	58–28
C	SURFACE	76–22	76–22	70–28
	INTERMEDIATE	76–22	76–22	70–28
	BASE	64–22	64–22	58–28

       - 2.2.1.5. ACCEPTANCE: ACCEPTANCE SHALL BE BASED ON INDOT SECTION 402.09.

*ESAL=(Equivalent Single–Axle Loads)

   - 2.3. AGGREGATE BASE
     - 2.3.1. THE BASE FOR ALL HOT MIX ASPHALT (HMA) SHALL BE AN AGGREGATE BASE CONSISTING OF THE SPECIFIED THICKNESS OF INDOT #53 PROCESSED AGGREGATE.
   - 2.4. TESTING
     - 2.4.1. ALL SUBGRADES AND PAVEMENT COMPONENTS OF NEW STREETS AND ALLEYS SHALL BE TESTED PRIOR TO PLACEMENT OF THE NEXT OVERLYING LAYER. TESTS SHALL BE CONDUCTED BY A SOIL TESTING COMPANY REGULARLY ENGAGED IN THE TESTING OF SOILS AND PAVEMENTS. CERTIFIED TEST RESULTS SHALL BE SUBMITTED TO THE CITY OF WARSAW STREET SUPERINTENDENT FOR APPROVAL. OVERLYING LAYERS SHALL NOT BE CONSTRUCTED UNTIL SAID TESTS RESULTS ARE APPROVED BY THE CITY. FAILURE TO SECURE SUCH INSPECTIONS MAY RESULT IN A REJECT OF IMPROVEMENTS, ADDITIONAL SURETY, OR OTHER REMEDIES DEEMED APPROPRIATE BY THE CITY OF WARSAW.
     - 2.4.2. ALL DENSITY TESTS SHALL BE PERFORMED IN ACCORDANCE WITH AASHTO T99 (STANDARD PROCTOR) TEST. THICKNESS AND DENSITY TESTS SHALL BE CONDUCTED AT LOCATIONS ESTABLISHED BY THE CITY OF WARSAW STREET SUPERINTENDENT BUT NOT LESS THAN ONE TEST EVERY 400 LINEAL FEET OF STREET OR ALLEY. THE SUB–BASE IS TO BE COMPACTED TO AT LEAST 98% STANDARD PROCTOR DENSITY.
     - 2.4.3. A "ROLL TEST" SHALL BE PERFORMED TO DETERMINE THE SUB–BASE MATERIALS STABILITY AND COMPACTION. RUTTING GREATER THAN ONE (1) INCH OR ADVERSE PUMPING WILL BE UNACCEPTABLE. PAVING MUST COMMENCE WITHIN FORTY–EIGHT (48) HOURS OF AN APPROVED "ROLL TEST" OR A NEW "ROLL TEST" SHALL BE REQUIRED. TWENTY–FOUR (24) HOUR NOTICE IS REQUIRED (IN WRITING) PRIOR TO A "ROLL TEST".

3. WORK IN RIGHT–OF–WAY
   - 3.1. ALL RIGHT–OF–WAY IMPROVEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CURRENT ADDITION OF THE INDIANA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS.
   - 3.2. CONTRACTOR SHALL OBTAIN A PERMIT FROM THE CITY OF WARSAW BUILDING DEPARTMENT, AND ANY OTHER REQUIRED PERMITS, PRIOR TO THE START OF WORK WITHIN THE RIGHT–OF–WAY.
   - 3.3. CONTRACTOR SHALL NOTIFY THE CITY OF WARSAW STREET SUPERINTENDENT 48 HOURS PRIOR TO THE START OF WORK WITHIN THE RIGHT–OF–WAY.

4. SIDEWALKS
   - 4.1. ALL SIDEWALKS SHALL BE CONSTRUCTED OF CLASS "A" CONCRETE AND BE PLACED ON A 4" THICK (MINIMUM) LAYER OF COARSE SAND BASE. ALL SIDEWALKS SHALL BE ACCESSIBLE TO PERSONS WITH DISABILITIES AND CONSTRUCTED IN CONFORMANCE WITH THE INTERNATIONAL BUILDING CODE AS AMENDED BY THE INDIANA ADMINISTRATIVE CODE 675 IAC 13–2.5–12.
   - 4.2. TO ESTABLISH THE SIDEWALK ELEVATION, THE SLOPE BETWEEN THE TOP OF CURB TO THE SIDEWALK SHALL BE NO LESS THAN 0.50 INCH PER FOOT AND NO MORE THAN 1.0 INCH PER FOOT.

5. CONCRETE CURB AND GUTTER
   - 5.1. ALL CURB AND GUTTER SHALL BE CONSTRUCTED OF CLASS A CONCRETE. (SEE DETAILS ON SHEET 4)
   - 5.2. MINIMUM CURB RADII AT STREET INTERSECTIONS SHALL BE IN ACCORDANCE WITH SPECIFICATIONS SHOWN IN STREET CROSS SECTION TABLE ON SHEET 1.

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CONSTRUCTION STANDARDS
STREET SPECIFICATIONS

SPECIFICATIONS (cont.)

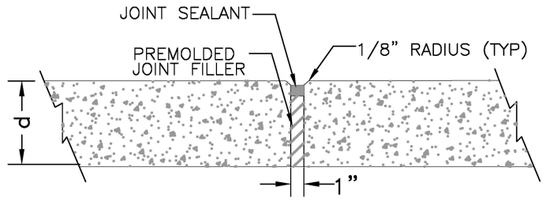
6. MINIMUM SIGNAGE REQUIREMENTS
   - 6.1. ALL MATERIALS ARE TO BE HIGH INTENSITY PRISMATIC GRADE REFLECTING FACE.
   - 6.2. STOP SIGNS (R1–1) SHALL BE OCTAGON WITH A WHITE MESSAGE AND BORDER ON A RED BACKGROUND. THE SIZE SHALL BE 30" X 30".
   - 6.3. YIELD SIGNS (R1–2) SHALL BE DOWNWARD POINTING EQUILATERAL TRIANGLE, HAVING A RED BORDER BAND AND A WHITE INTERIOR AND THE WORD "YIELD" IN RED INSIDE THE BORDER BAND. THE SIZE SHALL BE 36" X 36" X 36".
   - 6.4. WARNING SIGNS SHALL BE DIAMOND–SHAPED WITH YELLOW BACKGROUND WITH BLACK BORDER. THE SIZE SHALL BE 30" X 30".
   - 6.5. STREET OR ROAD MARKERS SHALL BE BLADES WITH GREEN BACKGROUND AND ½" WHITE BORDER AROUND THE EDGES. MINIMUM BLANK SIZE SHALL BE 12" X 24". THE LETTERS SHALL BE SERIES "B" WITH SIX (6") INCHES UPPER AND LOWER CASE AND FOUR AND ONE–HALF (4½") INCHES FOR ABBREVIATIONS (DR, TRL, RD, ETC.) ROAD MARKERS CAN BE MOUNTED ABOVE STOP SIGNS WITH 12" FROM TOP OF STOP SIGN TO BOTTOM OF ROAD MARKERS.
   - 6.6. BRACKETS FOR THE ABOVE SHALL BE SUPR–LOK OR ULTRA SUPR–LOK DEPENDING ON THE SIGN SIZE.
   - 6.7. POSTS SHALL BE 2¼" 12 GA. SQUARE GALVANIZED POST WITH A 12 GA. X 2½" X 3' ANCHORS. THE ANCHORS SHALL HAVE SIX (6") INCHES MIN/MAX EXPOSED ABOVE THE GROUND AND HAVE ONE (1') FOOT BELOW THE GROUND CLEANED OUT TO SLIDE POST INTO THE ANCHOR.
   - 6.8. POSITIONING & MOUNTING – THE HORIZONTAL DISTANCE FROM THE EDGE OF THE CURB OR SIDEWALK TO THE ROADSIDE EDGE OF SIGN SHALL BE TWO (2') FEET. VERTICAL HEIGHT SHALL BE SEVEN (7') FEET FROM EDGE OF CURB OR SIDEWALK TO BOTTOM OF SIGN. SIGNS ARE TO BE LOCATED ON THE RIGHT–HAND SIDE OF THE ROADWAY.

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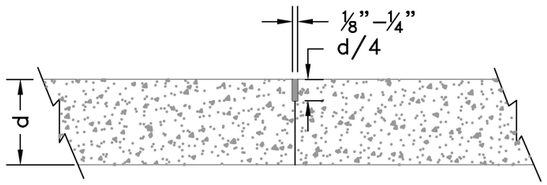
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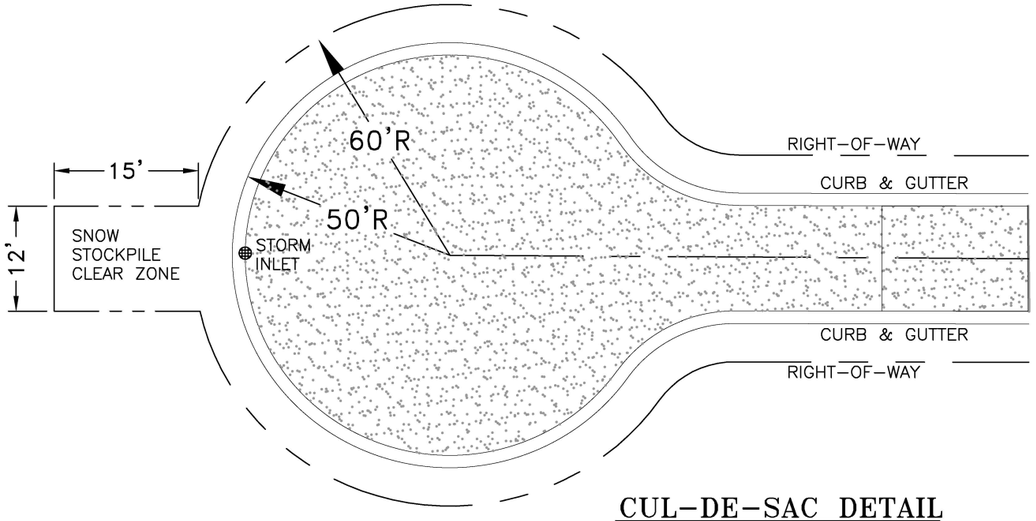
CONSTRUCTION STANDARDS
STREET SPECIFICATIONS



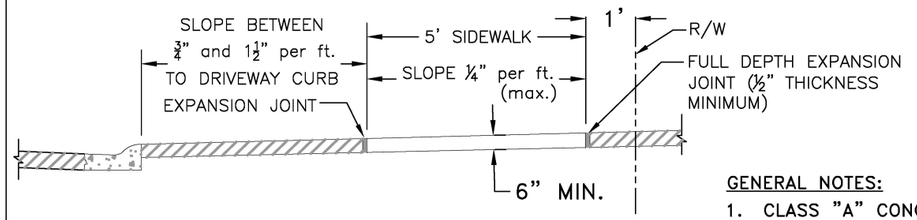
EXPANSION JOINT



CONTRACTION JOINT



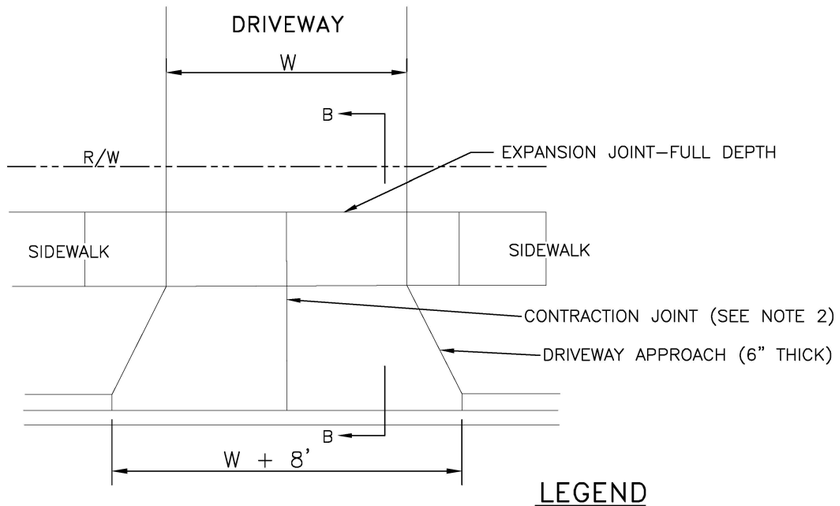
CUL-DE-SAC DETAIL



SECTION B–B

GENERAL NOTES:

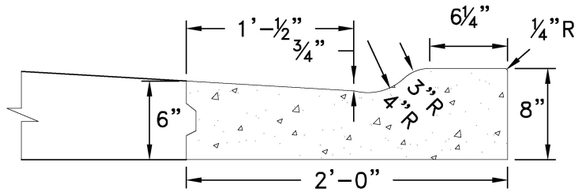
1. CLASS "A" CONCRETE SHALL BE USED IN ALL WALKS AND APPROACHES.
2. LONGITUDINAL CONTRACTION JOINT IS REQUIRED ON APPROACHES WHERE DRIVEWAY WIDTH (W) EXCEEDS 14 FEET. PLACE JOINT AT CENTER OF APPROACH.
3. "CURING CONCRETE" PER INDIANA DEPARTMENT OF TRANSPORTATION (INDOT) STANDARD SPECIFICATIONS. EITHER USE A CURING COMPOUND IMMEDIATELY AFTER FINISHING OR COVER AND KEEP MOIST FOR 72 HOURS.



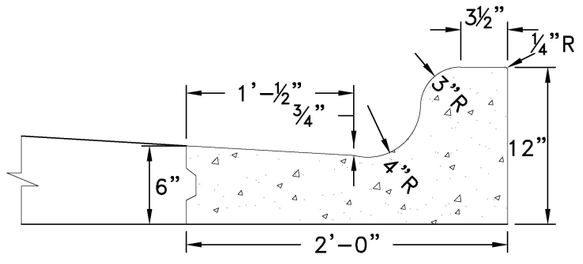
PLAN
RESIDENTIAL DRIVEWAY

FOR OTHER DRIVEWAYS, SUCH AS COMMERCIAL OR INDUSTRIAL, PLANS MUST BE APPROVED BY THE BOARD OF PUBLIC WORKS.

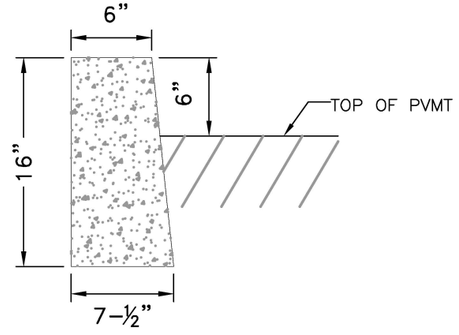
LEGEND
W–DRIVEWAY WIDTH
R/W–STREET RIGHT OF WAY



STANDARD DRIVEWAY CURB
COMB. CONC. CURB
& GUTTER TYPE "B"



STANDARD CURB
COMB. CONC. CURB
& GUTTER TYPE "B"



CONCRETE
STANDING CURB

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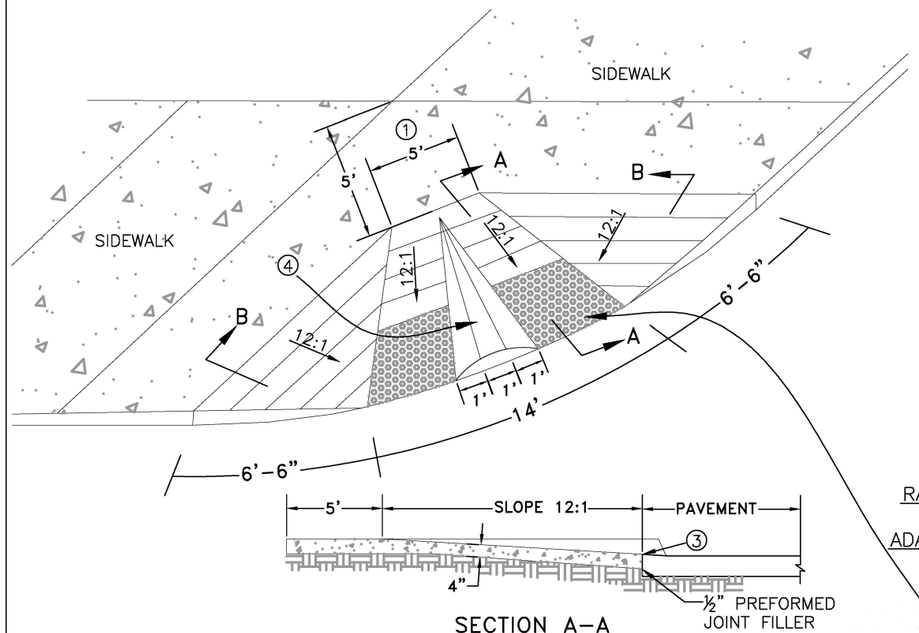
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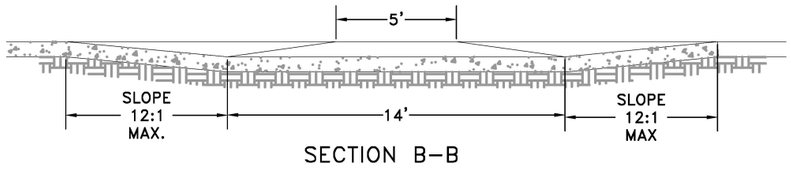
No.	Description	Date

CONSTRUCTION STANDARDS
DRIVEWAY, CURB & GUTTER,
AND CUL–DE–SAC DETAILS

4



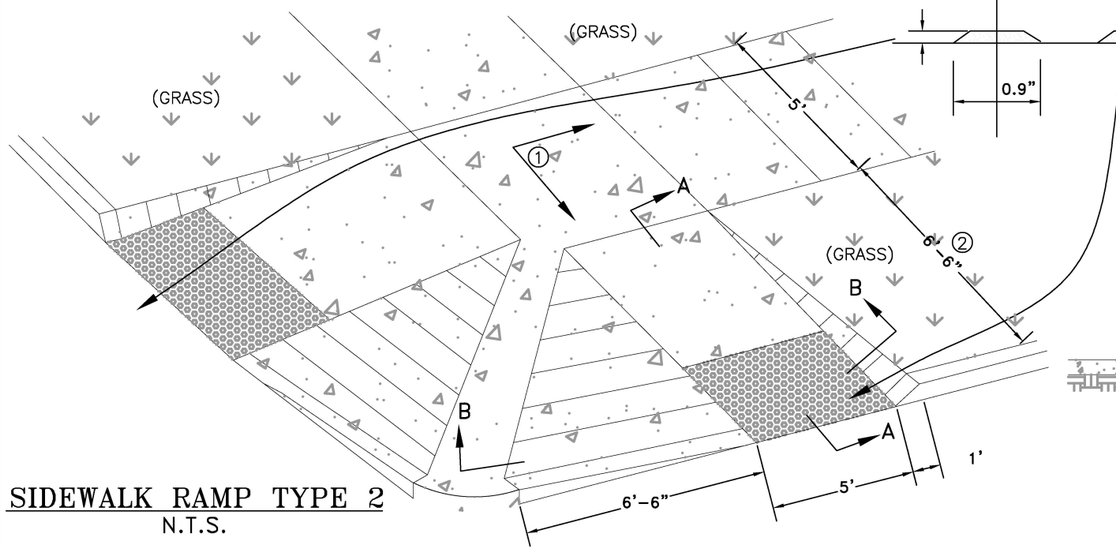
SECTION A–A



SECTION B–B

SIDEWALK RAMP TYPE 1
N.T.S.

RAMP DIMENSIONS, DETAILS, AND NOTES TYPICAL FOR ALL RAMPS.



SIDEWALK RAMP TYPE 2
N.T.S.

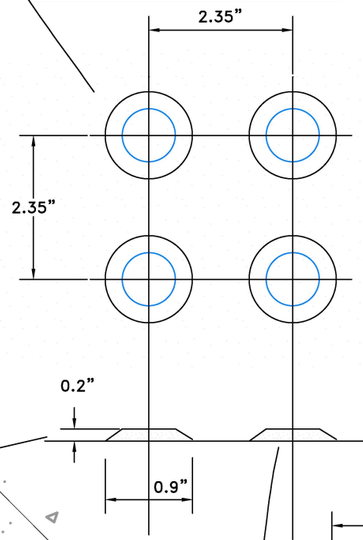
GENERAL NOTES:

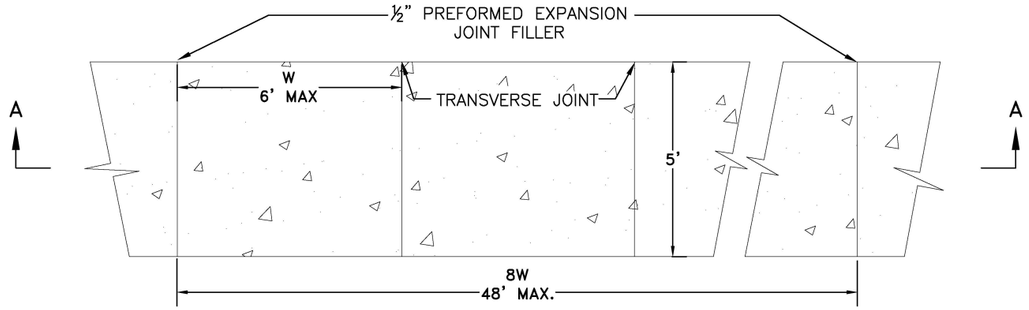
1. WHERE SIDEWALK IS CONSTRUCTED IMMEDIATELY ADJACENT TO CURB, THE SURFACE OF THE SIDEWALK SHALL BE CONSTRUCTED ½" HIGHER THAN THE TOP OF CURB.
2. TRANSFER JOINTS SHALL BE CUT WITH A JOINTER HAVING A RADIUS OF ¼" AT SPACING INDICATED OR DIRECTED.
3. COST OF PREFORMED JOINT FILLER SHALL BE INCLUDED IN CONTRACT PRICE FOR SIDEWALK CONSTRUCTION.
4. WHEN A NEW SIDEWALK IS CONSTRUCTED TO CONNECT TO AN EXISTING NARROWER SIDEWALK, THERE SHALL BE A 10'–0" TRANSITION TAPER SECTION. WHERE RIGHT–OF–WAY PERMITS, THE CURB SIDE FACE OF THE NEW SIDEWALK SHALL MATCH THE EXISTING SIDEWALK.
5. CONCRETE CONSTRUCTED ON CURB RAMPS SHALL HAVE A WOOD FLOAT FINISH. NO PLASTERING OF THE SURFACE SHALL BE PERMITTED. THE FINAL SURFACE TEXTURE OF CURB RAMPS SHALL BE BY COARSE BROOMING OR OTHER APPROVED METHOD.

KEY NOTES:

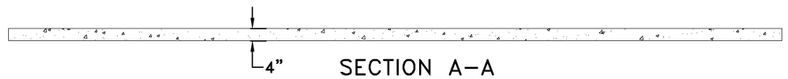
1. LANDING AREAS AT THE TOP OF CURB RAMPS SHALL HAVE A MAXIMUM CROSS SLOPE OF 1:50 IN ANY DIRECTION.
2. DIMENSIONS ARE BASED ON A 6" CURB HEIGHT AND SHALL BE PROPORTIONALLY ADJUSTED FOR OTHER CURB HEIGHTS.
3. THE BOTTOM EDGE OF CURB RAMPS SHALL BE FLUSH WITH THE ADJACENT PAVEMENT OR GUTTER LINE.
4. ADA RAISED AREAS SHALL BE INSTALLED AT INTERSECTIONS IDENTIFIED IN THE CITY OF WARSAW ADA TRANSITION PLAN TO PROVIDE DIRECTIONAL WARNING FOR THE VISUALLY IMPAIRED.

RAISED TRUNCATED DOMES
DIMENSIONS FROM
ADA ACCESSIBILITY GUIDELINES

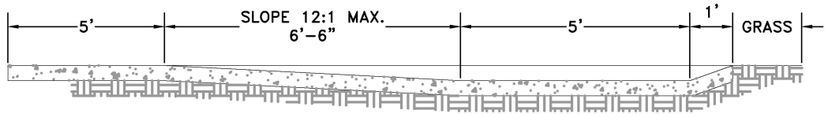




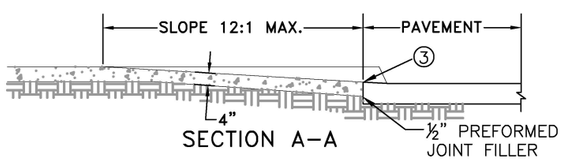
SIDEWALK
N.T.S.



SECTION A–A



SECTION B–B



SECTION A–A

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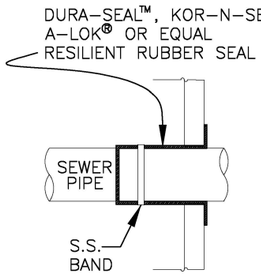
DATE: 12/20/2019

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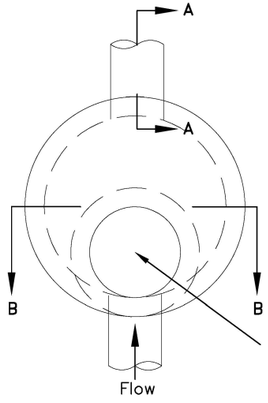
No.	Description	Date

CONSTRUCTION STANDARDS
SIDEWALK DETAILS

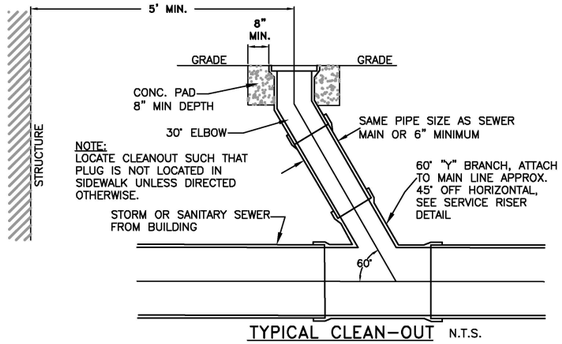
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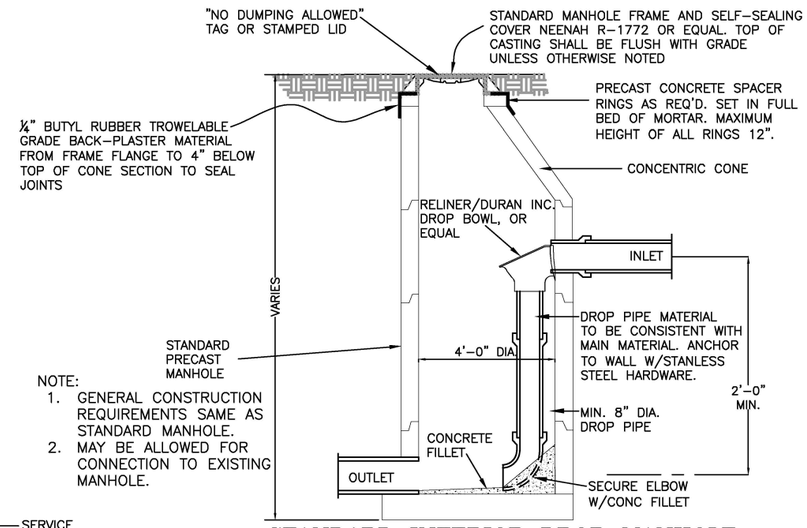
SECTION A–A



PLAN



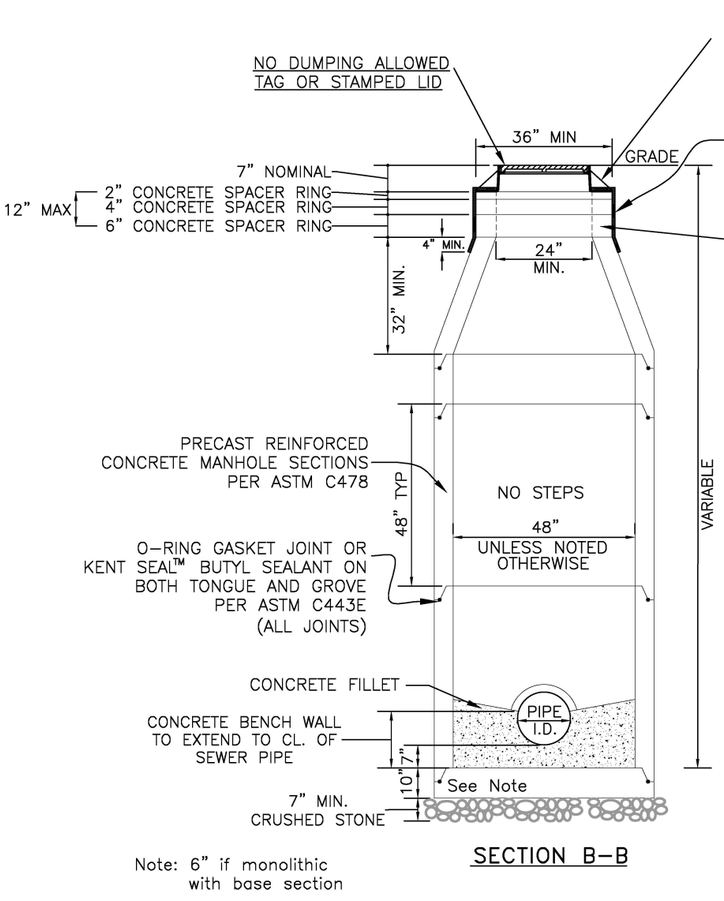
TYPICAL CLEAN–OUT N.T.S.



NOTE:
1. GENERAL CONSTRUCTION REQUIREMENTS SAME AS STANDARD MANHOLE.
2. MAY BE ALLOWED FOR CONNECTION TO EXISTING MANHOLE.

STANDARD INTERIOR DROP MANHOLE

(PROVIDE WHEN DISTANCE BETWEEN INLET AND OUTLET PIPES EXCEED 2'–0") N.T.S



Note: 6" if monolithic with base section

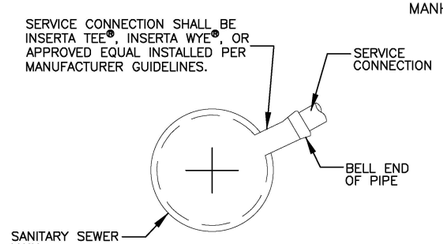
SECTION B–B

STANDARD MANHOLE FRAME AND SELF–SEALING COVER NEENAH R–1772 OR EQUAL. TOP OF CASTING SHALL BE FLUSH WITH GRADE UNLESS OTHERWISE NOTED

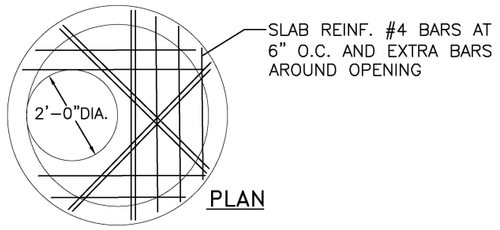
¼" BUTYL RUBBER TROWELABLE GRADE BACKPLASTER MATERIAL FROM FRAME FLANGE TO 4" BELOW THE TOP OF THE PRECAST MANHOLE SECTION TO SEAL JOINTS.

PRECAST CONCRETE SPACER RINGS, AS REQUIRED, SET IN FULL BED OF MORTAR, MAXIMUM HEIGHT OF ALL RINGS 12".

STANDARD MANHOLE TYPE "A"
(THRU 33" DIA. PIPE)
N.T.S

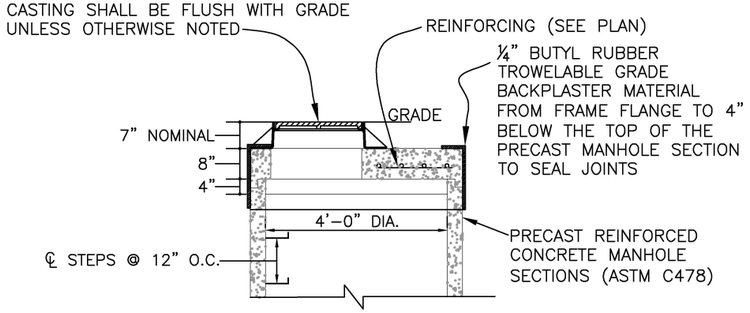


SEWER PIPE BLIND TAP
N.T.S

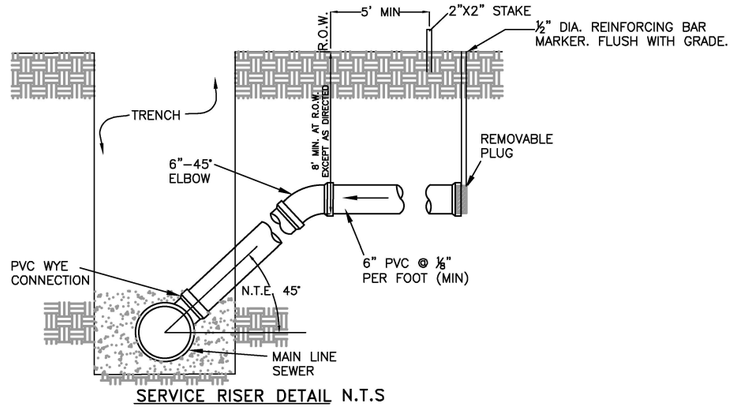


PLAN

STANDARD MANHOLE FRAME AND SELF–SEALING COVER NEENAH R–1772 OR EQUAL. TOP OF CASTING SHALL BE FLUSH WITH GRADE UNLESS OTHERWISE NOTED



STANDARD HEADROOM MANHOLE TYPE "A"–TOP
(THRU 33" DIA. PIPE)
N.T.S



SERVICE RISER DETAIL N.T.S

City of Lakes - Since 1854
WARSAW
INDIANA
Living, Working, Playing

DATE: 12/20/2019

REVISION

No.	Description	Date

CONSTRUCTION STANDARDS
SANITARY SEWER DETAILS

6

SANITARY SEWER SPECIFICATIONS

1. DESIGN
   - 1.1. ALL SANITARY SEWERS SHALL BE DESIGNED IN ACCORDANCE WITH 327 INDIANA ADMINISTRATIVE CODE 3-6 (327IAC3-6)

2. REGULATORY AGENCY APPROVAL
   - 2.1. ALL MUNICIPAL SANITARY SEWERS SHALL BE APPROVED BY THE INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT (IDEM) IN ACCORDANCE WITH 327 INDIANA ADMINISTRATIVE CODE ARTICLE 3. ONE COPY OF THE IDEM CONSTRUCTION PERMIT SHALL BE SUBMITTED TO THE WARSAW WASTEWATER UTILITY MANAGER AND TO THE WARSAW PLANNING DEPARTMENT A MINIMUM OF 48 HOURS PRIOR TO STARTING CONSTRUCTION ON ANY MUNICIPAL SANITARY SEWER OR APPURTENANCE.
   - 2.2. ACCEPTABLE GRAVITY SANITARY SEWER PIPE MATERIAL:
     - 2.2.1. POLYVINYL CHLORIDE (PVC) SDR35 OR SDR21.
     - 2.2.2. VITRIFIED CLAY PIPE.
     - 2.2.3. CEMENT-MORTAR LINED DUCTILE-IRON PIPE (DIP) WITH APPROVAL OF WASTEWATER UTILITY.
   - 2.3. ACCEPTABLE PRESSURE PIPE MATERIAL:
     - 2.3.1. POLYVINYL CHLORIDE (PVC) SDR21 (DIA >4") OR SDR26 (DIA <4").
     - 2.3.2. POLYVINYL CHLORIDE (PVC) STANDARD WATER TRANSMISSION PIPE (DIAMETER 14" THROUGH 36").
     - 2.3.3. HDPE SDR21 BASED ON OUTSIDE DIAMETER.
     - 2.3.4. DUCTILE IRON PIPE.

3. INSTALLATION
   - 3.1. PIPE SHALL BE INSTALLED IN ACCORDANCE WITH THE BEDDING DETAIL (SEE SHT 10).
   - 3.2. GPS (Global Positioning System) COORDINATES SHALL BE PROVIDED FOR ALL STRUCTURES AND FORCE MAINS.
   - 3.3. TRACER WIRE SHALL BE INSTALLED WITH ALL FORCE MAIN PIPE.
     - 3.3.1. TRACER WIRE SHALL BE COPPERHEAD REINFORCED TRACER WIRE #12 AWG EHS WITH TENSILE/BREAK LOAD OF 1150 LBS OR EQUAL
     - 3.3.2. TRACER WIRE SHALL BE SECURED TO THE TOP OF THE PIPE WITH TAPE AT INTERVALS NOT TO EXCEED 10 FEET.
     - 3.3.3. TRACER WIRE INSTALLED ON PIPE INSTALLED BY HORIZONTAL DIRECTIONAL DRILLING SHALL HAVE A TENSILE STRENGTH GREATER THAN THE PIPE BEING PULLED.
     - 3.3.4. TRACER WIRES SHALL HAVE A POINT OF CONNECTING THE TRACING EQUIPMENT AT EACH END OF PIPE. WIRE SHALL BE INSTALLED IN A RHINO TRIVIEW MARKER POST. THE POST SHALL BE MARKED WITH "WARNING: SEWER FORCE MAIN".
     - 3.3.5. HEAT SHRINK SPLICES ARE PERMISSIBLE ONLY ON TRACER WIRE AT HDD PIPE CONNECTIONS, MANHOLES, VALVE BOXES, STRUCTURES OR LOCATOR STATION. CONNECTIONS SHALL BE MADE BY STRIPPING IN INSULATION BACK ONE (1") INCH AND JOINING THE TWO ENDS USING AN APPROVED MECHANICAL CONNECTOR AND A SPLIT BOLT CONNECTOR. THE EXPOSED WIRE IS TO BE THOROUGHLY WRAPPED WITH ELECTRICAL TAPE.
   - 3.4. A MINIMUM OF ONE (1) AND A MAXIMUM OF THREE (3) CONCRETE ADJUSTING RINGS SHALL BE PERMITTED. ALL RINGS SHALL HAVE A MINIMUM OF $\frac{1}{2}$ INCH OF TYPE N MORTAR PLACED BETWEEN THE CASTING AND THE ADJUSTING RING(S). DRY STACKING IS NOT PERMITTED.
   - 3.5. STEPS SHALL NOT BE INSTALLED IN MANHOLES.

4. TESTING
   - 4.1. ALL SEWER AND MANHOLE TESTS SHALL BE CONDUCTED IN THE PRESENCE OF THE WASTEWATER UTILITY MANAGER, OR DESIGNATED REPRESENTATIVE. A 48 HOUR NOTICE IS REQUIRED BEFORE CONDUCTING ANY TESTS. WRITTEN RESULTS OF ALL TESTS SHALL BE SUBMITTED TO THE WASTEWATER UTILITY MANAGER WITHIN TEN (10) DAYS OF CONDUCTING TESTS.
   - 4.2. TESTS SHALL BE PERFORMED ON ALL FLEXIBLE PIPE IN ACCORDANCE WITH 327 INDIANA ADMINISTRATIVE CODE 3-6-19.
     - 4.2.1. A DEFLECTION TEST SHALL PERFORMED ON EACH FLEXIBLE PIPE FOLLOWING THE ELAPSE OF THIRTY (30) DAYS AFTER THE PLACEMENT OF THE FINAL BACKFILL.
     - 4.2.2. NO PIPE SHALL EXCEED A DEFLECTION OF FIVE PERCENT (5%) OR GREATER.
     - 4.2.3. THE DIAMETER OF THE RIGID BALL OR MANDREL USED FOR A DEFLECTION TEST SHALL BE NO LESS THAN NINETY-FIVE PERCENT (95%) OF THE BASE INSIDE DIAMETER OF THE PIPE TO BE TESTED DEPENDENT ON WHAT IS SPECIFIED IN THE CORRESPONDING ASTM STANDARD. THE TEST SHALL NOT BE PERFORMED WITH THE AID OF A MECHANICAL PULLING DEVICE.
   - 4.3. ALL GRAVITY SEWERS SHALL BE TESTED USING ONE (1) OF THE FOLLOWING LEAKAGE TEST TYPES:
     - 4.3.1. A HYDROSTATIC TEST SHALL BE PERFORMED WITH A MINIMUM OF TWO (2) FEET OF POSITIVE HEAD. THE RATE OF EXFILTRATION OR INFILTRATION SHALL NOT EXCEED TWO HUNDRED (200) GALLONS PER INCH OF PIPE DIAMETER PER LINEAR MILE PER DAY.
     - 4.3.2. AN AIR TEST SHALL CONFORM TO ONE OF THE FOLLOWING METHODS:
       - 4.3.2.1. ASTM C828-90 STANDARD TEST METHOD FOR LOW-PRESSURE AIR TEST OF VITRIFIED CLAY PIPE LINES, FOR CLAY PIPE.
       - 4.3.2.2. ASTM F1417-11a, STANDARD TEST METHOD FOR INSTALLATION ACCEPTANCE OF PLASTIC NON-PRESSURE SEWER LINES USING LOW-PRESSURE AIR, FOR PLASTIC PIPE.
   - 4.4. ALL FORCE MAINS SHALL BE PRESSURE AND LEAK TESTED IN ACCORDANCE WITH ONE (1) OF THE FOLLOWING METHODS:
     - 4.4.1. AWWA STANDARD C600-93, AWWA STANDARD FOR INSTALLATION OF DUCTILE-IRON WATER MAINS AND THEIR APPURTENANCES.
     - 4.4.2. AWWA STANDARD C605-94, AWWA STANDARD FOR UNDERGROUND INSTALLATION OF POLYVINYL CHLORIDE (PVC) PRESSURE PIPE AND FITTINGS FOR WATER.

5. AS-BUILT DRAWINGS
   - 5.1. THE DEVELOPER/CONTRACTOR SHALL PROVIDE THE BOARD OF PUBLIC WORKS CERTIFIED "AS-BUILT" DRAWINGS OF ALL SANITARY SEWERS AND SERVICE CONNECTIONS. AT A MINIMUM THE FOLLOWING INFORMATION SHALL BE INCLUDED ON THE DRAWINGS:
     - 5.1.1. PIPE SIZE AND MATERIAL
     - 5.1.2. INVERT ELEVATIONS
     - 5.1.3. CASTING RIM ELEVATIONS
     - 5.1.4. LENGTHS AND SLOPES OF ALL PIPES
     - 5.1.5. CERTIFIED STATEMENT BY A PROFESSIONAL ENGINEER OR PROFESSIONAL LAND SURVEYOR LICENSED IN THE STATE OF INDIANA THAT THE INSTALLED SANITARY SYSTEM SUBSTANTIALLY COMPLIES WITH CONSTRUCTION PLANS APPROVED BY THE CITY OF WARSAW AND WITH 327IAC3-6.

City of Lakes - Since 1854
WARSAW
INDIANA
Living, Working, Playing

DATE: 12/20/2019

REVISION

No.	Description	Date

CONSTRUCTION STANDARDS
SANITARY SEWER SPECIFICATIONS

STORM SEWER SPECIFICATIONS

1. DESIGN
   - 1.1. THE STORM WATER DRAINAGE TECHNICAL REQUIREMENTS, WARSAW, INDIANA SHALL BE USED FOR THE DESIGN OF ALL STORM WATER SYSTEMS WITHIN THE CITY RIGHT-OF-WAYS AND ESTUARIES.
   - 1.2. THE HYDRAULIC CAPACITY OF ALL STORM SEWERS SHALL BE DESIGNED TO CONVEY NOT LESS THAN THE MAXIMUM RATE OF RUNOFF FROM A 10-YEAR, 24-HOUR DESIGN STORM.
   - 1.3. THE MINIMUM DIAMETER OF STORM SEWERS SHALL BE 12-INCHES.
   - 1.4. STORM WATER RUNOFF SHALL BE CONTAINED ON SITE AND RELEASED AT A CONTROLLED RATE. THE ON SITE STORAGE SYSTEM (IE., BASINS, SUBSURFACE STORAGE SYSTEM, ETC.) SHALL BE DESIGNED TO CONTAIN POST DEVELOPMENT RUNOFF FROM A 100-YEAR, 24-HOUR DESIGN STORM WITH A RELEASE RATE NOT-TO-EXCEED THE PRE-DEVELOPED PEAK FLOW RATE FROM A 10-YEAR, 24-HOUR DESIGN STORM OR THE HYDRAULIC CAPACITY OF THE DOWNSTREAM RECEIVING STREAM, WHICHEVER IS MORE RESTRICTIVE.
   - 1.5. ACCEPTABLE GRAVITY STORM SEWER PIPE MATERIAL:
     - 1.5.1. REINFORCED CONCRETE PIPE (RCP).
     - 1.5.2. POLY VINYL CHLORIDE (PVC) SDR35 OR SDR21.
     - 1.5.3. HIGH DENSITY POLYETHYLENE (HDPE) DUAL WALL, GASKET PIPE
     - 1.5.4. CEMENT-MORTAR LINED DUCTILE-IRON PIPE (DIP) WITH APPROVAL OF STORM WATER UTILITY.

2. INSTALLATION
   - 2.1. PIPE SHALL BE INSTALLED IN ACCORDANCE WITH THE BEDDING DETAIL (SEE SHT 10).
   - 2.2. A MINIMUM OF ONE (1) AND A MAXIMUM OF THREE (3) CONCRETE ADJUSTING RINGS SHALL BE PERMITTED. ALL RINGS SHALL HAVE A MINIMUM OF ½ INCH OF TYPE N MORTAR PLACED BETWEEN THE CASTING AND THE ADJUSTING RING(S). DRY STACKING IS NOT PERMITTED.
   - 2.3. STEPS SHALL NOT BE INSTALLED IN MANHOLES.

3. TESTING
   - 3.1. ALL SEWER TESTS SHALL BE CONDUCTED IN THE PRESENCE OF THE STORMWATER UTILITY MANAGER, OR DESIGNATED REPRESENTATIVE. A 48 HOUR NOTICE IS REQUIRED BEFORE CONDUCTING ANY TESTS. WRITTEN RESULTS OF ALL TESTS SHALL BE SUBMITTED TO THE WASTEWATER UTILITY MANAGER WITHIN TEN (10) DAYS OF CONDUCTING TESTS.
   - 3.2. DEFLECTION TESTS SHALL BE PERFORMED ON ALL FLEXIBLE PIPE.
     - 3.2.1. A DEFLECTION TEST SHALL PERFORMED ON EACH FLEXIBLE PIPE FOLLOWING THE ELAPSE OF THIRTY (30) DAYS AFTER THE PLACEMENT OF THE FINAL BACKFILL.
     - 3.2.2. NO PIPE SHALL EXCEED A DEFLECTION OF FIVE PERCENT (5%) OR GREATER.
     - 3.2.3. THE DIAMETER OF THE RIGID BALL OR MANDREL USED FOR A DEFLECTION TEST SHALL BE NO LESS THAN NINETY-FIVE PERCENT (95%) OF THE BASE INSIDE DIAMETER OF THE PIPE TO BE TESTED DEPENDENT ON WHAT IS SPECIFIED IN THE CORRESPONDING ASTM STANDARD. THE TEST SHALL NOT BE PERFORMED WITH THE AID OF A MECHANICAL PULLING DEVICE.
   - 3.3. ALL GRAVITY SEWERS SHALL BE TESTED USING ONE (1) OF THE FOLLOWING LEAKAGE TEST TYPES:
     - 3.3.1. A HYDROSTATIC TEST SHALL BE PERFORMED WITH A MINIMUM OF TWO (2) FEET OF POSITIVE HEAD. THE RATE OF EXFILTRATION OR INFILTRATION SHALL NOT EXCEED TWO HUNDRED (200) GALLONS PER INCH OF PIPE DIAMETER PER LINEAR MILE PER DAY.
     - 3.3.2. CONCRETE PIPE SHALL BE TESTED IN ACCORDANCE WITH ASTM C1103-14 STANDARD.
     - 3.3.3. AN AIR TEST SHALL CONFORM TO ONE OF THE FOLLOWING METHODS:
       - 3.3.3.1. ASTM C828-90 STANDARD TEST METHOD FOR LOW-PRESSURE AIR TEST OF VITRIFIED CLAY PIPE LINES, FOR CLAY PIPE.
       - 3.3.3.2. ASTM FF1417-11a, STANDARD TEST METHOD FOR INSTALLATION ACCEPTANCE OF PLASTIC NON-PRESSURE SEWER LINES USING LOW-PRESSURE AIR, FOR PLASTIC PIPE.

4. AS-BUILT DRAWINGS
   - 4.1. THE DEVELOPER/CONTRACTOR SHALL PROVIDE THE BOARD OF PUBLIC WORKS CERTIFIED "AS-BUILT" DRAWINGS OF ALL STORM SEWERS AND RUNOFF CONTROL SYSTEMS. AT A MINIMUM THE FOLLOWING INFORMATION SHALL BE INCLUDED ON THE DRAWINGS:
     - 4.1.1. PIPE SIZE AND MATERIAL
     - 4.1.2. INVERT ELEVATIONS
     - 4.1.3. CASTING RIM ELEVATIONS
     - 4.1.4. LENGTHS AND SLOPES OF ALL PIPES
     - 4.1.5. DETENTION/RETENTION BASIN VOLUME
     - 4.1.6. CERTIFIED STATEMENT BY A PROFESSIONAL ENGINEER OR PROFESSIONAL LAND SURVEYOR LICENSED IN THE STATE OF INDIANA THAT THE INSTALLED STORM SYSTEM SUBSTANTIALLY COMPLIES WITH CONSTRUCTION PLANS APPROVED BY THE CITY OF WARSAW.

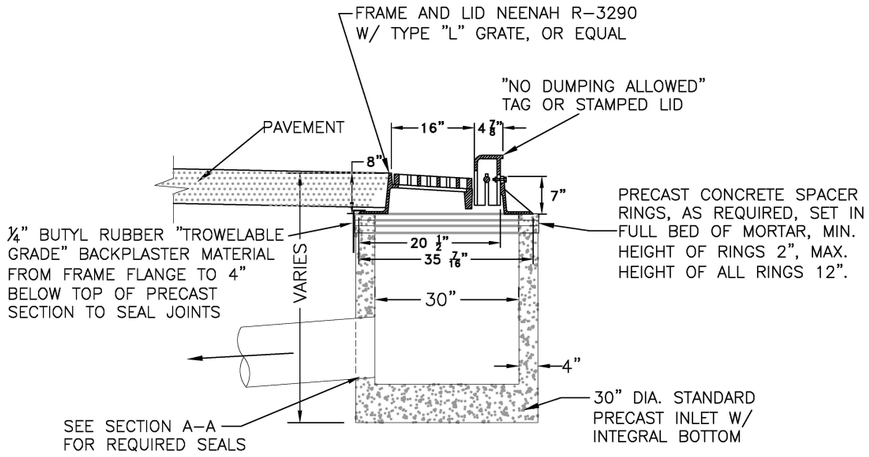
City of Lakes - Since 1854
WARSAW
INDIANA
Living, Working, Playing

DATE: 12/20/2019

REVISION

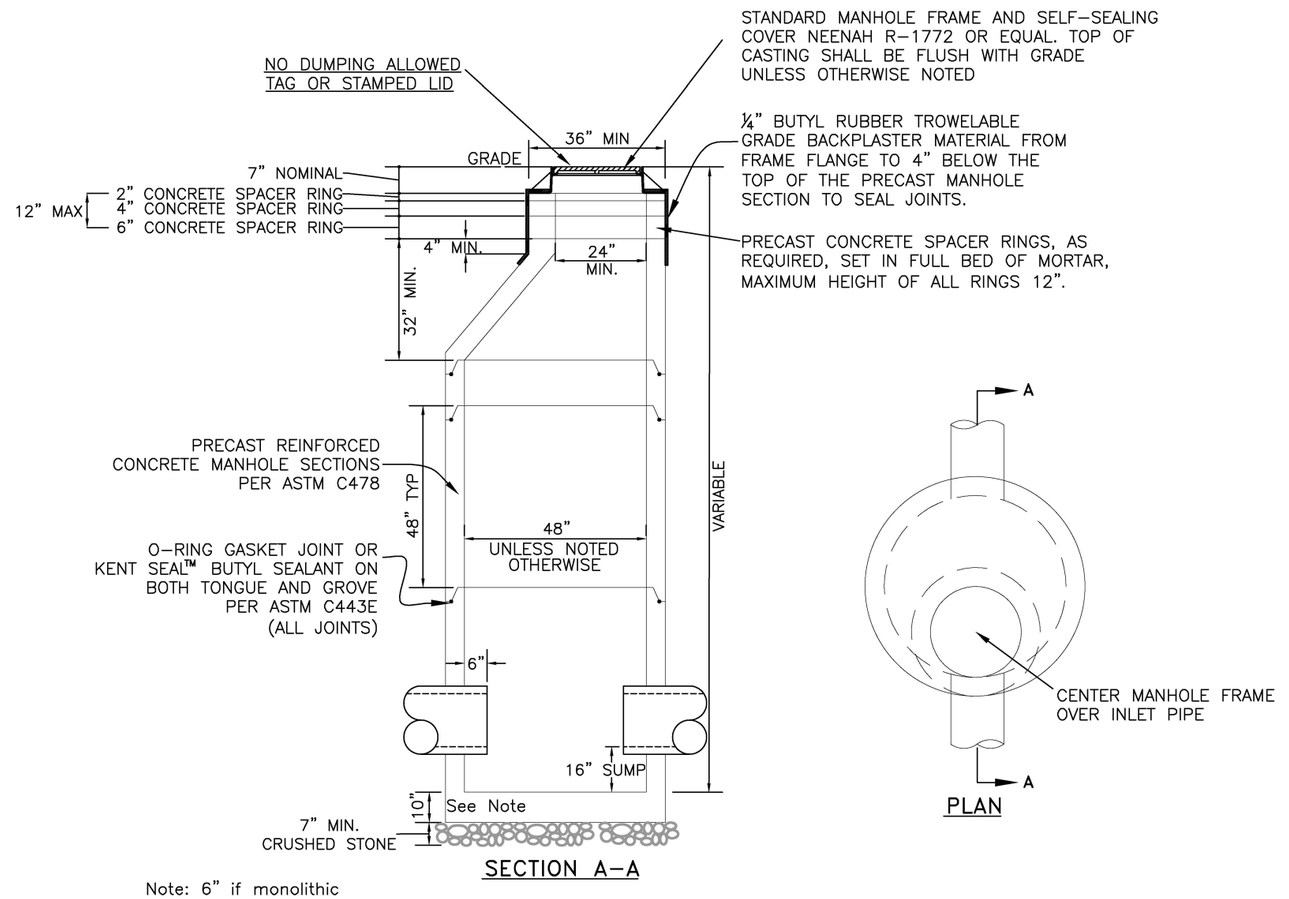
No.	Description	Date

CONSTRUCTION STANDARDS
STORM SEWER SPECIFICATIONS



STANDARD CURB INLET

N.T.S

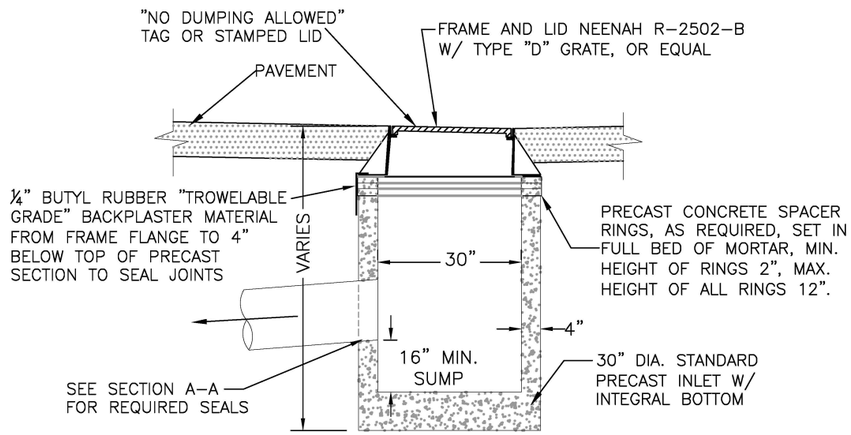


SECTION A-A

Note: 6" if monolithic
with base section

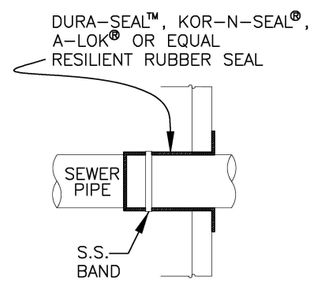
STANDARD MANHOLE TYPE "A"
(THRU 33" DIA. PIPE)

N.T.S



STANDARD CATCH BASIN

N.T.S



PIPE CONNECTION DETAIL

City of Lakes - Since 1854
WARSAW
INDIANA
Living, Working, Playing

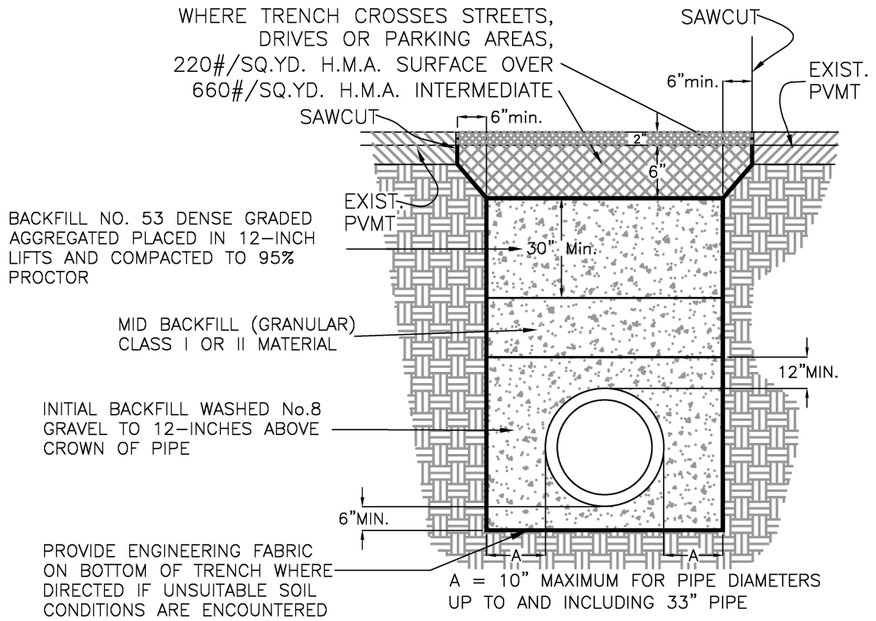
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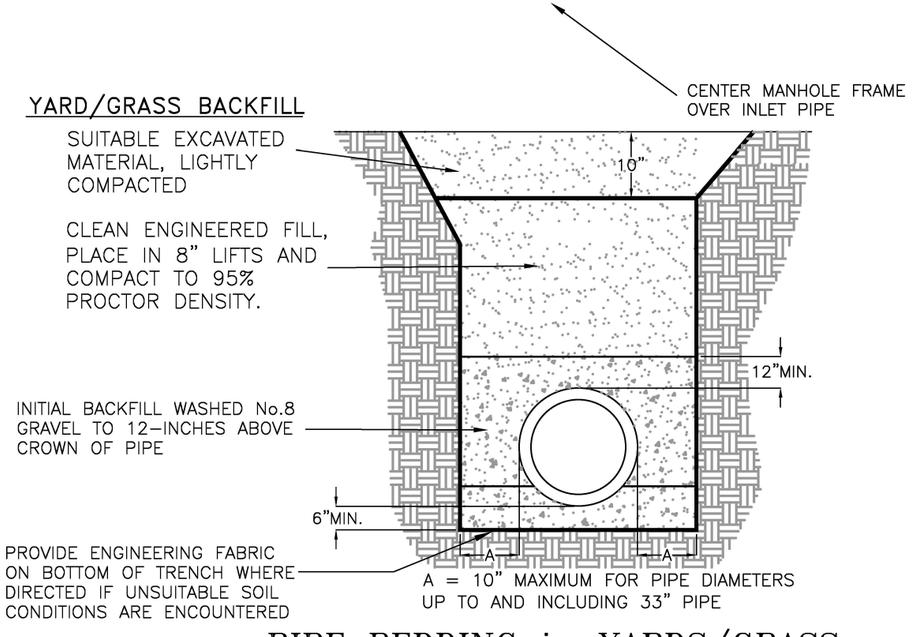
CONSTRUCTION STANDARDS
STORM SEWER DETAILS

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PIPE BEDDING IN CITY STREETS/DRIVES/PARKING AREAS

N.T.S



PIPE BEDDING in YARDS/GRASS

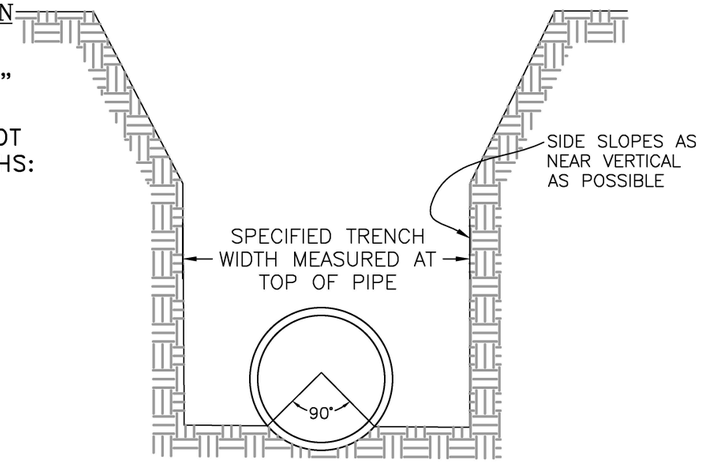
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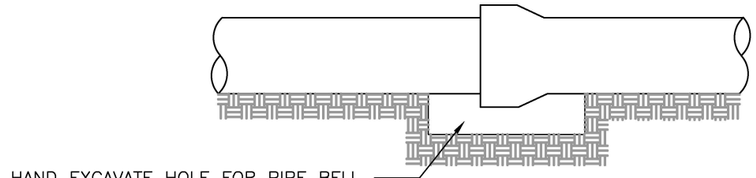
TRENCH SCHEDULE

MAXIMUM WIDTH OF EXCAVATION

THE BOTTOM WIDTH OF THE TRENCH FROM BOTTOM TO 12" ABOVE PIPE AND INSIDE THE SHEETING, IF USED, SHALL NOT EXCEED THE FOLLOWING WIDTHS:

PIPE SIZE	WIDTH
6"	2'-6"
8"	2'-6"
10"	2'-6"
12"	2'-8"
15"	2'-10"
18"	3'-2"
21"	3'-8"
24"	4'-0"
27"	4'-3"
30"	4'-7"
33"	5'-4"
36"	5'-8"





PIPE LAYING

N.T.S.

City of Lakes - Since 1854
WARSAW
INDIANA
Living, Working, Playing

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CONSTRUCTION STANDARDS
STORM SEWER DETAILS

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