The Indiana Department of Transportation specifies pipe in a two – step process. It is essential to know the basics of that process in order to request the pipe you want and that the agency will accept. It is imperative to keep in mind that it is not sufficiently detailed to merely request "type 1, 2, 3, 4, or 5" pipe.

The first step in that process is the five general types of pipe. These are Type 1 – open pipe culverts under mainline roadway; Type 2 – storm water pipes with generally smooth interior, enclosed systems; Type 3 – open pipe culverts under driveway entrances; Type 4 – underdrain, or generally small diameter, perforated pipe; and Type 5 – "broken back" pipe, being that which makes multiple bends or angled turns. The INDOT pipe classification table immediately below gives a generalized overview of what pipe materials are acceptable for the 5 different classifications. Bear in mind this is a generalized classification and is still subject to material specificity contained within the software described later.

| MATERIAL | PIPE TYPE | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Non-Reinforced Concrete Pipe | | | | X | |
| Non-Reinforced Concrete Pipe, Class 3 (S) | X | X | X | | |
| Reinforced Concrete Pipe (S) | X | X | X | | |
| Reinforced Concrete Horizontal Elliptical Pipe (S) | X | X | X | | |
| Corrugated Steel Pipe (C) | X | | X | | X |
| Corrugated Steel Pipe-Arch (C) | X | | X | | X |
| Polymer Precoated Galvanized Corrugated Steel Pipe (C) | X | | X | | X |
| Polymer Precoated Galvanized Corrugated Steel Pipe Type 1A (S) | X | X | X | | X |
| Fully Bituminous Coated and Lined Corrugated Steel Pipe (S) | | X | | | X |
| Polymer Precoated Galvanized Corr. Steel Pipe Arch Type IIA (S) | X | X | X | | X |
| Fully Bituminous Coated and Lined Corrugated Steel Pipe-Arch (S) | | X | | | X |
| Corrugated Aluminum Alloy Pipe (C) | X | | X | | X |
| Corrugated Aluminum Alloy Pipe-Arch (C) | X | | X | | X |
| Structural Plate Steel Pipe (C) | X | | X | | |
| Polymer Precoated Galvanized Corrugated Steel Pipe-Arch (C) | X | | X | | X |

| MATERIAL | PIPE TYPE | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Structural Plate Steel Pipe-Arch (C) | X | | X | | |
| Structural Plate Aluminum Alloy Pipe (C) | X | | X | | |
| Structural Plate Aluminum Alloy Pipe-Arch (C) | X | | X | | |
| Clay Pipe, Extra Strength (S) | X | X | X | | |
| Clay Pipe | | | | X | |
| Perforated Clay Pipe | | | | X | |
| Corrugated Polyethylene Pipe, Type SP | | | | X | |
| Corrugated Polyethylene Pipe, Type (S) | X | X | X | X | X |
| Ribbed Polyethylene Pipe (S) | X | X | X | | X |
| Smooth Wall Polyethylene Pipe (S) | X | X | X | | X |
| Corrugated Polyethylene Tubing | | | | X | |
| Perforated PVC Semicircular Pipe | | | | X | |
| Profile Wall PVC Pipe (S) | X | X | X | X | X |
| Smooth Wall PVC Pipe (S) | X | X | X | | X |
| Concrete Drain Tile | | | | X | |
| Clay Drain Tile | | | | X | |

LEGEND

(C)- Corrugated Interior Culvert Pipe.

(S)- Smooth Interior Culvert or Storm Sewer Pipe.

GENERAL NOTES

1. The prescribed uses for the pipe types are as follows:
   a. Type 1 Pipe - Culverts under mainline pavement and public road approaches.
   b. Type 2 Pipe - Storm sewer pipe.
   c. Type 3 Pipe - Culverts under driveways and field entrances.
   d. Type 4 Pipe - Drain tile and longitudinal underdrains.
   e. Type 5 Pipe - Broken back and other installations requiring coupled pipe.
3. Refer to Standard Drawings E 715-PSLC-01 through E 715-PSLC-03 for required pipe service life criteria.
4. Any pipe material which is in accordance with the designated pipe type, acceptable for cover conditions, and conforms to service life criteria may be installed.

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE CLASSIFICATION TABLES

MARCH 2009

STANDARD DRAWING NO. E 715-PIPE-01

Within those 5 types, the INDOT generates details of acceptable material types via their pipe selection software. This software has several parameters that are input by the project designer. Inputs include such values as soil pH and resistivity, pipe gradient, height of cover, abrasive/non – abrasive stream, roughness coefficient, pipe diameter, etc, which all govern specific material for particular runs of pipe within the 5 general types. The link for the downloadable software is:
http://www.in.gov/dot/div/contracts/standards/pipe/exe or
http://www.in.gov/dot/div/contracts/standards/

The outputs of the design engineer`s pipe selection software are then entered on the pipe material data sheet of the set of plans. This sheet is normally found immediately following the structure data table sheet – which gives details of individual pipe and culvert structures having to do with lengths, whether cross/left/right side of roadway, inverts, etc – and before the cross section sheets.

The pipe material data sheet can be cross – referenced with the structure data table to give you a thorough "snap shot" of acceptable pipe for that particular project. The pipe material data sheet will have a row across the top which indicates structure number, type and size of pipe. Along the left hand side of the sheet is a column which lists different pipe materials, be they CSP, RCP, HDPE, PVC, vitrified clay, etc. This column and row form a matrix of cells in which the designer places the output of acceptable materials from the pipe selection software. For CSP, this could be corrugated in a variety of patterns, smooth interior dual wall, variable gauges, coatings, etc. Exhibit A below is a sample cut from a blank pipe material data sheet, while Exhibit B is a sample cut of a blank structure data table.

## Exhibit A – Pipe Material Data Sheet

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PIPE TYPE / SHAPE | | | | | | | |
| | SMOOTH PIPE SIZE | | | | | | | |
| | CORRUGATED PIPE SIZE | | | | | | | |
| | RCP/RCHEP (S) | CLASS | | | | | | |
| | | $D_{0.3}$ RATING | | | | | | |
| | NON-REINFORCED CONCRETE PIPE, CLASS 3 (S) | | | | | | | |
| | CORRUGATED PE PIPE, TYPE S (S)* | | | | | | | |
| | RIBBED PE PIPE (S)* | | | | | | | |
| | SMOOTH WALL PE PIPE (S)* / MAXIMUM DR | | | | | | | |
| | PROFILE WALL PVC PIPE (S) | | | | | | | |
| | SMOOTH WALL PVC PIPE (S)* | | | | | | | |
| | VITRIFIED CLAY PIPE, EXTRA STRENGTH (S) | | | | | | | |
| CORRUGATED STEEL PIPE / PIPE-ARCH | FULLY BIT. PAVED & LINED (S) | CORR. PROFILE | | | | | | |
| | | THICKNESS | | | | | | |
| | ZINC COATED (C) | CORR. PROFILE | | | | | | |
| | | THICKNESS | | | | | | |
| | ZINC COATED W/ BPI (C) | CORR. PROFILE | | | | | | |
| | | THICKNESS | | | | | | |
| | ALUM. COATED TYPE 2 (C) | CORR. PROFILE | | | | | | |
| | | THICKNESS | | | | | | |
| | ALUM. COATED TYPE 2 W/ BPI (C) | CORR. PROFILE | | | | | | |
| | | THICKNESS | | | | | | |
| | POLYMER PRECOATED GALVANIZED (C) | CORR. PROFILE | | | | | | |
| | | THICKNESS | | | | | | |
| | POLYMER PRECOATED GALVANIZED W/ BPI (C) | CORR. PROFILE | | | | | | |
| | | THICKNESS | | | | | | |
| | FIBER BONDED BITUMINOUS COATED (C) | CORR. PROFILE | | | | | | |
| | | THICKNESS | | | | | | |
| | FIBER BONDED BITUMINOUS COATED W/ BPI (C) | CORR. PROFILE | | | | | | |
| | | THICKNESS | | | | | | |
| | CORRUGATED ALUM. ALLOY PIPE (C) | CORR. PROFILE | | | | | | |
| | | THICKNESS | | | | | | |
| | CORRUGATED ALUM. ALLOY PIPE W/ BPI (C) | CORR. PROFILE | | | | | | |
| | | THICKNESS | | | | | | |
| | STR. PLATE ALUMINUM ALLOY PLATE (C) | CORR. PROFILE | | | | | | |
| | | THICKNESS | | | | | | |
| | STR. PLATE ALUMINUM ALLOY PLATE W/ CFP (C) | CORR. PROFILE | | | | | | |
| | | THICKNESS | | | | | | |
| | STR. PLATE STEEL PIPE (C) | CORR. PROFILE | | | | | | |
| | | THICKNESS ** | | | | | | |
| | STR. PLATE STEEL PIPE W/ CFP (C) | CORR. PROFILE | | | | | | |
| | | THICKNESS ** | | | | | | |

# Exhibit B – Structure Data Table

| STRUCTURE NUMBER | LOCATION | | | | | SIZE | DESCRIPTION | | LENGTH | SKEW | FLOW LINE | | | SERVICE LIFE | SITE DESIGNATION | pH | BACKFILL METHOD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | STATION | LEFT | RIGHT | CROSS | OFFSET | | PIPE TYPE | MANHOLE, INLET, CATCH BASIN, OR SPECIALTY STRUCTURE | | | COVER | UP STREAM | DOWN STREAM | | | | |
| | | | | | FT | INCHES | | | LFT | | LFT | ELEV. | ELEV. | YRS. | | | |
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A word of caution: pipe material may differ along the length of a project. It is not necessarily safe to assume that a pipe material acceptable for one pipe type/structure at the beginning of a project is the same throughout to the end of a roadway project. This is why we at St Regis Culvert do a thorough analysis and quantity takeoff to assure that our customers receive a quote that is accurate and reflects exactly what the INDOT staff on any particular job will accept.

## Summary:

1) INDOT has 5 general pipe types – under mainline roadway, enclosed storm sewers, driveway culverts, underdrain and “broken back”.
2) Within those 5 types, particular pipes are allowed with specific material characteristics.
3) Those particular material types are governed by pipe selection software used by the design engineer.
4) Output results of software are place on a matrix of pipe material data sheets.
5) Pipe material data sheets and structure data tables are used in conjunction with one another to do accurate material and quantity takeoffs.
6) In cases where the design engineer has not done a thorough job of running pipe selection software, the contractor should contact the District Construction Engineer for the district in which the job is located for a ruling on acceptable material.
7) Technical questions in regard to CSP material, gauges, coatings, hydraulic and structural performance, etc should be directed to your St Regis Culvert representative.