



PROCESS
INDUSTRY
PRACTICES

COMPLETE REVISION
July 2018

Civil

**PIP CVE02350M
Roadway Design Guide (Metric)**

PURPOSE AND USE OF PROCESS INDUSTRY PRACTICES

In an effort to minimize the cost of process industry facilities, this Practice has been prepared from the technical requirements in the existing standards of major industrial users, contractors, or standards organizations. By harmonizing these technical requirements into a single set of Practices, administrative, application, and engineering costs to both the purchaser and the manufacturer should be reduced. While this Practice is expected to incorporate the majority of requirements of most users, individual applications may involve requirements that will be appended to and take precedence over this Practice. Determinations concerning fitness for purpose and particular matters or application of the Practice to particular project or engineering situations should not be made solely on information contained in these materials. The use of trade names from time to time should not be viewed as an expression of preference but rather recognized as normal usage in the trade. Other brands having the same specifications are equally correct and may be substituted for those named. All Practices or guidelines are intended to be consistent with applicable laws and regulations including OSHA requirements. To the extent these Practices or guidelines should conflict with OSHA or other applicable laws or regulations, such laws or regulations must be followed. Consult an appropriate professional before applying or acting on any material contained in or suggested by the Practice.

This Practice is subject to revision at any time.

© Process Industry Practices (PIP), Construction Industry Institute, The University of Texas at Austin, 3925 West Braker Lane (R4500), Austin, Texas 78759. PIP Member Companies and Subscribers may copy this Practice for their internal use. Changes or modifications of any kind are not permitted within any PIP Practice without the express written authorization of PIP. Authorized Users may attach addenda or overlays to clearly indicate modifications or exceptions to specific sections of PIP Practices. Authorized Users may provide their clients, suppliers and contractors with copies of the Practice solely for Authorized Users' purposes. These purposes include but are not limited to the procurement process (e.g., as attachments to requests for quotation/ purchase orders or requests for proposals/contracts) and preparation and issue of design engineering deliverables for use on a specific project by Authorized User's client. PIP's copyright notices must be clearly indicated and unequivocally incorporated in documents where an Authorized User desires to provide any third party with copies of the Practice.

PUBLISHING HISTORY

September 2008 *Issued*
January 2012 *Complete Revision*
July 2018 *Complete Revision*

Not printed with State funds



PIP CVE02350M Roadway Design Guide (Metric)

Table of Contents

| | | | |
|------------------------------------------------|-----------|------------------------------------------------------------------|-----------|
| 1. Scope | 2 | 7. Paving/Roadway Design | 15 |
| 2. References | 2 | 7.1 Paving System Selection | 15 |
| 2.1 Process Industry Practices | 2 | 7.2 Flexible Pavement | 16 |
| 2.2 Industry Guides, Codes and Standards | 2 | 7.3 Rigid Paving | 25 |
| 3. Definitions | 3 | 7.4 Alternative Surface Treatment for Vehicle Traffic Area | 29 |
| 4. Roadway Classifications | 4 | 7.5 Paving over Low-Strength Soils | 32 |
| 4.1 General | 4 | 8. Drainage Considerations | 32 |
| 4.2 Primary Roadways | 4 | 8.1 Roadway Drainage | 32 |
| 4.3 Secondary Roadways | 5 | 8.2 Curbs, Gutters and Inlets | 33 |
| 4.4 Tertiary Roadways | 6 | 8.3 Ditches | 33 |
| 4.5 Construction and Heavy Haul Roadways | 6 | 8.4 Culverts | 34 |
| 5. General Design Considerations | 6 | 8.5 Headwalls | 37 |
| 5.1 Right-of-Way | 6 | 9. Culvert, Pipeline, and Pipe Crossings | 37 |
| 5.2 Access to Public Roadways | 6 | 9.1 Pipeline and Pipe Protection at Crossings | 37 |
| 5.3 Materials | 9 | 9.2 Pipe Loading | 37 |
| 5.4 Climate | 9 | 9.3 Culvert Design | 38 |
| 5.5 Traffic Loading | 9 | 10. Typical Roadway Details | 40 |
| 6. Layout and Traffic Control | 10 | CVE02350M-01 – Typical Sections at Cut and Fill | |
| 6.1 General | 10 | CVE02350M-02 – Typical Clearance Envelope | |
| 6.2 Traffic Flow | 10 | | |
| 6.3 Plant Roadway Turning/Layout/Grades | 10 | | |
| 6.4 Vertical Alignment | 12 | | |
| 6.5 Horizontal and Vertical Clearances | 13 | | |
| 6.6 Guardrails and/or Guard Posts | 14 | | |
| 6.7 Pavement Marking/Signage | 14 | | |
| 6.8 Railroad Crossings | 14 | | |
| 6.9 Miscellaneous Information | 14 | | |

1. Scope

This Practice describes roadway classifications and provides guidance for design of right-of-ways, access to public roadways, use of local materials, climate effects, traffic loading, layout and traffic control, design of paving and roadways, providing drainage, and providing railroad and pipeline crossings for roadways within plant boundaries. This Practice uses United States standards for roadway design. User should research regional standards for variations from this design guide.

2. References

Applicable requirements of the following Practices, and industry guides, codes and standards should be considered an integral part of this Practice. The edition in effect on the date of contract award should be used, except as otherwise noted. Short titles are used herein where appropriate.

2.1 Process Industry Practices (PIP)

- PIP CVS02350 - *Roadway and Area Paving Construction Specification*
- PIP CVS02700 - *Underground Gravity Sewers Specification*
- PIP PNE00003 - *Process Unit and Offsites Layout Guide*
- PIP CVI02350 - *Roadway and Area Paving General Notes and Typical Details*

2.2 Industry Guides, Codes and Standards

- American Association of State Highway and Transportation Officials (AASHTO)
 - *Guide for Design of Pavement Structures (GDPS)*
 - *A Policy on Geometric Design of Highways and Streets (GDHS)*
 - *Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400) (VLVLR)*
- American Concrete Institute (ACI)
 - *ACI 325.12R - Guide for Design of Jointed Concrete Pavements for Streets and Local Roads*
 - *ACI 350M-06 - Code Requirements for Environmental Engineering Concrete Structures and Commentary*
 - *ACI 504R - Guide to Sealing Joints in Concrete Structures*
- American Concrete Pipe Association (ACPA)
 - *Concrete Pipe Design Manual*
 - *Design Data 1M (DD 1M) - Highway Live Loads on Concrete Pipe*
- ASTM International (ASTM)
 - *ASTM C14M - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe (Metric)*
 - *ASTM C76M - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric)*
 - *ASTM D1195/D1195M - Standard Test Method for Repetitive Static Plate Load Tests of Soils and Flexible Pavement Components, for Use in Evaluation and Design of Airport and Highway Pavements*