

| | | |
|-----------|------------------------------------------------------------------|--------------|
| 12.7.3 | Coastal Bridge and Culvert Design Techniques | 12-13 |
| 12.7.4 | Computer Modeling..... | 12-14 |
| 12.7.5 | Hydrologic Analysis..... | 12-15 |
| 12.7.5.1 | Bridge Location | 12-16 |
| 12.7.5.2 | Channel Cross Section | 12-16 |
| 12.7.5.3 | Drainage Area Characteristics | 12-16 |
| 12.7.5.4 | Storm Tides | 12-16 |
| 12.7.5.5 | Flow Velocity..... | 12-17 |
| 12.7.6 | Hydraulic Analysis | 12-18 |
| 12.7.7 | Documentation | 12-19 |
| 12.7.8 | H&HA Submission | 12-19 |
| 12.8 | Riprap for Protection of Bridge Abutments and Piers | 12-20 |
| 12.9 | Removal of Existing Bridge and Approach Embankments | 12-21 |
| 12.10 | Temporary Construction Causeway Design | 12-23 |
| 12.10.1 | Background..... | 12-23 |
| 12.10.2 | Causeway Design..... | 12-23 |
| 12.10.2.1 | Design Objectives | 12-23 |
| 12.10.2.2 | Plans | 12-23 |
| 12.10.2.3 | General Notes | 12-24 |
| 12.10.3 | Design Procedure..... | 12-24 |
| 12.11 | Daily Stream Flow Information..... | 12-25 |
| 12.11.1 | Background..... | 12-25 |
| 12.11.2 | Development of a Composite Stream Flow Hydrograph..... | 12-25 |
| 12.12 | References..... | 12-27 |

List of Figures

| | | |
|--------------|--------------------------------------------------|-------|
| Figure 12-1. | Removal of Approach Embankment | 12-21 |
| Figure 12-2. | Quantifying Removal of Approach Embankment | 12-22 |
| Figure 12-3. | Temporary Construction Causeway Design | 12-24 |

List of Appendices

| | |
|----------------|-----------------------------------------------------------------|
| Appendix 12A-1 | Definitions and Abbreviations |
| Appendix 12B-1 | Hydrologic and Hydraulic Analysis Report Distribution List |
| Appendix 12B-2 | LD-293D Hydrologic and Hydraulic Analysis Documentation Outline |
| Appendix 12B-3 | LD-293 Hydraulic Analysis Report |
| Appendix 12B-4 | LD-293B Report to VDOT Road Designer |
| Appendix 12B-5 | LD-293C Report to VDOT District Environmental Manager |
| Appendix 12C-1 | LD-23 Structure and Bridge Data Sheet |
| Appendix 12C-2 | Tidal Bridge Scour Data and Worksheet |
| Appendix 12C-3 | Table of Storm Tide Description of Virginia Coast |