

CHAPTER 11 STRUCTURES

11.00 INTRODUCTION

11.01 REMOVAL OF BRIDGES

11.02 GUIDANCE FOR HEAVY EQUIPMENT & MATERIALS ON BRIDGES

11.03 TEMPORARY STRUCTURES FOR THE PROTECTION OF THE PUBLIC

11.05 PILE DRIVING CAP AND HAMMER INFORMATION

11.10 EARTHWORK FOR STRUCTURES

11.11 EXCAVATION

11.12 BACKFILLING STRUCTURES

- Culverts
- Bridge Abutments
- Measurement and Payment

11.20 FOUNDATIONS

11.21 STAKING AND CHECKING LOCATIONS OF STRUCTURES

- Check and Double Check
- Documentation
- Common Survey Errors to Avoid
- Encountering Old Substructures
- Setting Bench Marks (Post Construction)

11.22 PILING AND PILE DRIVING

- Pile Driving
- Vibratory Hammers
- Gravity Hammers
- Diesel Hammers
- Bearing and Penetration
- Retaps
- Dynamic Pile Analyzer
- Static Load Tests

11.23 SPLICING PILE

- Welding Steel Pile
- Concrete Pile

11.24 PILING ACCEPTANCE

- Steel Pile
- Wood Pile

Steel Pile Cutoffs

11.25 WAVE EQUATION

Hammer Data Form
Driving Graphs
Log of Piling Driven

11.26 PREBORED HOLES

Typical Preboring
Special Prebore Situations
Bentonite

11.27 DRILLED SHAFTS

11.30 BRIDGES

11.31 FALSEWORK

Temporary Fastenings
Falsework Plans
Falsework Inspection
Falsework Foundations
Materials
Project Quality
Miscellaneous Items
Falsework Adjacent to Traffic
Field Changes
Inspection During Concrete Placement
Removal of Falsework

11.32 BRIDGES - STEEL BEAM

Prebolting Meeting
Erecting Steel Beams
High Strength Fasteners
Painting

11.33 BRIDGES - CONCRETE BEAM

Precast - Prestressed Deck Panels
Pretensioned Prestressed Concrete Beam (PPC Beam Erection)
Diaphragms (Steel or Concrete)

11.40 REINFORCEMENT

General Placement Guidelines for Bridge Reinforcing Steel

11.41 PLACEMENT AND CHECKING (BRIDGE FLOORS)

Slab Thickness

- Clearance of Bottom Reinforcement
- Clearance of Top Mat Reinforcement
- Cover Over Top Mat of Reinforcement
- Slab Bridges
- Special Attention Areas

11.42 EPOXY COATED REINFORCEMENT

- Care and Handling
- Field Inspection
- Repair of Damaged Coating

11.43 CAGE STEEL (DRILLED SHAFTS)

11.44 SPLICING

- Splice Approval

11.45 PAYMENT FOR REINFORCING STEEL

11.50 CONCRETE (STRUCTURAL, CLASS X, AND FLOWABLE MORTAR)

11.51 PCC PLANT PAGE (FORMS 800240E and 800240M)

11.52 USE OF READY MIXED STRUCTURAL CONCRETE

- Prepour Meeting
- Inspector's Checklist

11.53 ADMIXTURES

- Air Entraining Admixtures
- Water Reducing Admixtures - Regular
- Water Reducing Admixtures - Super Plasticizers
- Retarding Admixtures
- Accelerating Admixtures
- Corrosion Inhibiting Admixtures
- Finely Divided Mineral Admixtures
- Pozzolanic Materials
- Fly Ash (Class C & F)
- Silica Fume
- Cementitious Materials
- Ground Granulated Blast Furnace Slag (GGBFS)

11.54 USE OF INSULATED FORMS FOR PROTECTION

- Checking Temperature of Concrete

11.55 DECK PLACEMENT AND HEAT OF HYDRATION

- Deck Placement
- Deck Concrete Temperature and Curing

Placement Considerations
Field Documentation
Heat of Hydration

11.56 PLACEMENT METHODS (PUMPING, BELTING, AND CRANE BUCKET)

Crane and Bucket
Belt Placement
Pump Placement

11.57 FORM REMOVAL

Setting Beams

11.58 CLASS 3 CONCRETE SURFACE FINISH (RAIL AND BEAMS)

Approval of Materials
Application of Finish
Concrete Railings

11.59 FLOWABLE MORTAR

Backfilling Culverts - Typical Grading
Plugging Culverts
Backfilling Culverts - Under Bridges
Filling Voids Between Culverts

11.60 DECKS AND OVERLAYS

11.61 DECK OVERLAY PREPARATION

Class A Floor Repair
Class A Surface Preparation
Work on Adjacent Lanes

11.62 SEQUENCE OF POURING

Use of Retarders
Concrete Bridge Floors
Placement Methods

11.63 INSTALLATION OF JOINTS

Preformed Neoprene Joints
Steel Extruded Expansion Joints (Strip Seals)

11.64 BRIDGE FLOORS

Finishing and Equipment
Profile Grades - Overlays
Transverse Grooving
Missed Texturing

11.65 CONCRETE

- Concrete Mobile Mixers
- Frequency of Checks
- Density Testing

11.66 APPROACH SECTIONS

- Approach Pavements to Bridge Abutments
- "Movable" Abutments
- "Fixed" Abutments
- Bridge Approach Tapers
- Shoulder Maintenance

11.67 SMOOTHNESS OF BRIDGE DECKS

- Checklist
- Specification 2317
- Surface Checking

11.70 BARRIER RAILS

11.71 CONCRETE F-SHAPE, OPEN, AND RETROFIT RAIL

- Rail Concrete Placement and Bridge Deck Falsework

11.72 SLIP FORM BARRIER RAIL

- Longitudinal Cracks
- Reinforcement
- Reinforcement Bar Cover
- Misalignment and Nonuniform Top Elevation
- Shadowing
- Mix Design for Slip Form and Cast-in-Place
- Curing of Slip Form Barrier Rail
- Expansion Joint Construction In Barrier Rail

11.73 CAST-IN-PLACE (RETROFIT) BARRIER RAIL

- Preventing Dowel Installation Damage of Conduit

11.74 CAST-IN-PLACE OPEN BARRIER RAIL FORM REMOVAL

11.80 REINFORCED CONCRETE CULVERTS

11.81 DESIGN CHANGES ON CULVERTS

11.82 INSTALLING REINFORCING STEEL, PLACING CONCRETE, AND FORM REMOVAL

- Installing Reinforcing Steel
- Placing Concrete
- Removal of Wall Forms

Removal of Slab Forms

11.83 BOX CULVERT CURTAIN WALLS

Sheet Pile Curtain Wall
Reinforcement Placement

11.84 BOX CULVERT BELL JOINTS