

NEW BRIDGE CONSTRUCTION HANDBOOK

The purpose of this handbook is to help the field inspectors find the information they need by listing the different resource documents for a particular subject.

The Article in the specifications and the Section in the Construction Manual are listed directly along with a reference to Appendix A of the handbook, which has a listing of other possible reference documents for each item in the check list.

The first draft of this handbook is being made available for use and review from the field. We encourage any questions, comments or suggestions you have regarding the handbook to be directed to Kyle Frame of the Central Construction Office (Phone 515-239-1619; Office Vision kframe or e-mail at kframe@max.state.ia.us).

Any questions concerning the purpose, intent or clarification of the resource documents or methods of construction, will be addressed and added to Appendix B of the handbook as they come in.

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Central Construction Office

4/27/2000

NEW BRIDGE CONSTRUCTION

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NEW BRIDGE CONSTRUCTION

Staking Check List

| | <u>ITEMS TO CHECK</u> | <u>REFERENCE MATERIAL</u> | | |
|--------------------------|--|---------------------------|--------------------------------------|-----------------------------|
| | | Check List Appendix | Specifications (Check Supplementals) | Construction Manual |
| <input type="checkbox"/> | Pertinent Documents | A1, A2, A3, A5, A7, A8 | | |
| <input type="checkbox"/> | Staking Layout and Dimensions | A1, A3, A7, A8 | | Chapter 11 Section 11.21 |
| <input type="checkbox"/> | Staking Control Benchmarks and Cross Ties | A1, A3, A5 | | Chapter 11 Section 11.21 |
| <input type="checkbox"/> | Minimum Staking Requirements | A2 | Section 2526 Article 2526.01 | |
| <input type="checkbox"/> | Independent Survey Check Performed | A2, A3, A7 | Section 2526 Article 2526.01 | Chapter 11 Section 11.21 |
| <input type="checkbox"/> | Surveying Documentation | A2, A3, A7 | Section 2526 Article 2526.01 | Chapter 11 Section 11.21 |
| <input type="checkbox"/> | Construction Survey Offset Stakes | A5 | | |
| <input type="checkbox"/> | Slope Stakes | A5 | | |
| <input type="checkbox"/> | Meeting to Review Staking | A3, A7 | | Chapter 11 Section 11.21 |
| <input type="checkbox"/> | Verify Staking Fits Field Conditions | A5 | | |
| <input type="checkbox"/> | Preservation of Stakes | A2, A3, A7 | Section 2526 Article 2526.01 | Chapter 11 Section 11.21 |
| <input type="checkbox"/> | Periodic Check of Stakes | A3 | | Chapter 11 Section 11.21 |
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NEW BRIDGE CONSTRUCTION

Excavation and Erosion Control

| | <u>ITEMS TO CHECK</u> | <u>REFERENCE MATERIAL</u> | | |
|--------------------------|--|---------------------------|--|---------------------------|
| | | Check List Appendix | Specifications (Check Supplementals) | Construction Manual |
| <input type="checkbox"/> | Pertinent Documents | A1, A2, A3, A7, A9 | | |
| <input type="checkbox"/> | Erosion Control | A2, A3, A9 | Section 2525 Article 2525.04 | Chapter 7 Section 7.40 |
| <input type="checkbox"/> | Classification of Excavation | A2 | Section 2402 Article 2402.11 | |
| <input type="checkbox"/> | Excavation Quantity Limits | A2 | Section 2402 Article 2402.12 | |
| <input type="checkbox"/> | Cross Section Prior to Excavation | A2, A7 | Section 2402 Article 2402.12 | |
| <input type="checkbox"/> | Shoring | A1, A2 | Section 2402 Article 2402.01 | |
| <input type="checkbox"/> | Cofferdam | A2 | Section 2405 Articles 2405.02 & 2405.03 | |
| <input type="checkbox"/> | Drainage Control Foundation Preparation | A2 | Section 2402 Article 2402.04 | |
| <input type="checkbox"/> | Foundation Treatment | | | |
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NEW BRIDGE CONSTRUCTION

Foundations – Drilled Shafts

| | <u>ITEMS TO CHECK</u> | <u>REFERENCE MATERIAL</u> | | |
|--------------------------|---|---------------------------|--------------------------------------|---------------------|
| | | Check List Appendix | Specifications (Check Supplementals) | Construction Manual |
| <input type="checkbox"/> | Pertinent Documents | A1, A10 | | |
| <input type="checkbox"/> | Drilled Shaft Installation Plan | A10 | | |
| <input type="checkbox"/> | Preproduction Meeting | | | |
| <input type="checkbox"/> | Check Layout | A1 | | |
| <input type="checkbox"/> | Shaft Construction | A10 | | |
| <input type="checkbox"/> | Slurry Test | A10 | | |
| <input type="checkbox"/> | Excavation Inspection and Construction Tolerances | A10 | | |
| <input type="checkbox"/> | Reinforcing Steel Placement | A6, A10 | | |
| <input type="checkbox"/> | Cage Centering and Support | A10 | | |
| <input type="checkbox"/> | Concrete Mix | A10 | | |
| <input type="checkbox"/> | Concrete Placement and Slurry Capture | A10 | | |
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NEW BRIDGE CONSTRUCTION

Foundations – Driven Pile

| | <u>ITEMS TO CHECK</u> | <u>REFERENCE MATERIAL</u> | | |
|--------------------------|---|--------------------------------------|--------------------------------------|--------------------------|
| | | Check List Appendix | Specifications (Check Supplementals) | Construction Manual |
| <input type="checkbox"/> | Pertinent Documents | A1, A2, A3, A7 | | |
| <input type="checkbox"/> | Check Layout | A1 | | |
| <input type="checkbox"/> | Wave Equation Analysis | A2, A3, A11 | Section 2501 Article 2501.09J | Chapter 11 Section 11.25 |
| <input type="checkbox"/> | Prebore Holes and Bentonite Slurry | A2, A3, A7, A11 | Section 2501 Article 2501.19 | Chapter 11 Section 11.26 |
| <input type="checkbox"/> | Pile Materials | A2, A3, A4, A7, A11 IM's 204, 462 | Section 2501 Article 2501.02 | Chapter 11 Section 11.24 |
| <input type="checkbox"/> | Type of Pile Driving Equipment | A2, A3, A11 | Section 2501 Article 2501.09 | Chapter 11 Section 11.22 |
| <input type="checkbox"/> | Verify Pile Driving Equipment | A2, A3, A7, A11 | Section 2501 Article 2501.09 | Chapter 11 Section 11.22 |
| <input type="checkbox"/> | Pile Position, Alignment and Batter | A1, A2, A11 | Section 2501 Article 2501.12 | |
| <input type="checkbox"/> | Production Pile Driving Logging of Pile | A3, A11 | | Chapter 11 Section 11.25 |
| <input type="checkbox"/> | Retapping | A2, A3, A11 | Section 2501 Article 2501.13E | Chapter 11 Section 11.22 |
| <input type="checkbox"/> | Static or Dynamic Pile Testing | A2, A3, A11 | Section 2501 Article 2501.13 C, D | Chapter 11 Section 11.22 |
| <input type="checkbox"/> | Extensions and Splices | A2, A3, A4, A11 IM's 558, 560 | Section 2501 Article 2501.18 | Chapter 11 Section 11.23 |
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NEW BRIDGE CONSTRUCTION

Foundations – Spread Footing

| | <u>ITEMS TO CHECK</u> | <u>REFERENCE MATERIAL</u> | | |
|--------------------------|----------------------------|---------------------------|--------------------------------------|---------------------------|
| | | Check List Appendix | Specifications (Check Supplementals) | Construction Manual |
| <input type="checkbox"/> | Pertinent Documents | A1, A2 | | |
| <input type="checkbox"/> | Check Layout and Elevation | A1 | | |
| <input type="checkbox"/> | Keyed into Rock | A1, A2 | Section 2405 Article 2405.04 | |
| <input type="checkbox"/> | Rock Soundness | A2, A3 | Section 2405 Article 2405.04 | Chapter 11 Sec. 11.31B |
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NEW BRIDGE CONSTRUCTION

Forming

| | <u>ITEMS TO CHECK</u> | <u>REFERENCE MATERIAL</u> | | |
|--------------------------|-------------------------------|----------------------------------|--------------------------------------|--------------------------|
| | | Check List Appendix | Specifications (Check Supplementals) | Construction Manual |
| <input type="checkbox"/> | Pertinent Documents | A1, A2, A3, A7 | | |
| <input type="checkbox"/> | Check Layout and Dimensions | A1 | | |
| <input type="checkbox"/> | Form Type and Material | A2, A7 | Section 2403 Article 2403.07E | |
| <input type="checkbox"/> | Form Quality | A2, A7 | Section 2403 Article 2403.07E | |
| <input type="checkbox"/> | Form Support and Bracing | A2, A7 | Section 2403 Article 2403.07E | |
| <input type="checkbox"/> | Chamfers, Fillets and Keyways | A1, A2, A7 | | |
| <input type="checkbox"/> | Release Agent | A2 | Section 2403 Article 2403.07E | |
| <input type="checkbox"/> | Forms and Falsework Design | A2, A7 | Section 2403 Article 2403.17 | |
| <input type="checkbox"/> | Insulated Forms | A2, A3 | Section 2403 Article 2403.11 | Chapter 11 Section 11.54 |
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NEW BRIDGE CONSTRUCTION

Falsework

| | <u>ITEMS TO CHECK</u> | <u>REFERENCE MATERIAL</u> | | |
|--------------------------|------------------------------|----------------------------------|--------------------------------------|--------------------------|
| | | Check List Appendix | Specifications (Check Supplementals) | Construction Manual |
| <input type="checkbox"/> | Pertinent Documents | A2, A3 | | |
| <input type="checkbox"/> | Materials | A2, A3 | Section 2403 Article 2403.17 | Chapter 11 Section 11.31 |
| <input type="checkbox"/> | Designed by Engineer | A2, A3 | Section 2403 Article 2403.17 | Chapter 11 Section 11.31 |
| <input type="checkbox"/> | Falsework Plans | A2, A3 | Section 2403 Article 2403.17F | Chapter 11 Section 11.31 |
| <input type="checkbox"/> | Construction of Falsework | A2, A3 | Section 2403 Article 2403.17B | Chapter 11 Section 11.31 |
| <input type="checkbox"/> | Deflections | A2, A3 | Section 2403 Article 2403.17E | Chapter 11 Section 11.31 |
| <input type="checkbox"/> | Removal | A2, A3 | Section 2403 Article 2403.18 | Chapter 11 Section 11.31 |
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NEW BRIDGE CONSTRUCTION

Concrete Beams

| | <u>ITEMS TO CHECK</u> | <u>REFERENCE MATERIAL</u> | | |
|--------------------------|---------------------------------------|----------------------------------|--------------------------------------|-----------------------------|
| | | Check List Appendix | Specifications (Check Supplementals) | Construction Manual |
| <input type="checkbox"/> | Pertinent Documents | A1, A2, A3, A7 | | |
| <input type="checkbox"/> | Tolerances | A2, A7 | Section 2407 Article 2407.12 | |
| <input type="checkbox"/> | Handling and Storage | A2, A7 | Section 2407 Article 2407.13 | |
| <input type="checkbox"/> | Layout for Bearing Position | A1 | | |
| <input type="checkbox"/> | Placement of Bearing Units | A1 | | |
| <input type="checkbox"/> | Check Sweep | | | |
| <input type="checkbox"/> | Setting Beams | A3 | | Chapter 11 Section 11.57 |
| <input type="checkbox"/> | Alignment of Beams | | | |
| <input type="checkbox"/> | Intermediate Diaphragms - Steel | A3 | | Chapter 11 Section 11.33 |
| <input type="checkbox"/> | Intermediate Diaphragms – Concrete | A3 | | Chapter 11 Section 11.33 |
| <input type="checkbox"/> | Diaphragm Coil Ties | A1 | | |
| <input type="checkbox"/> | Layout and Shooting of Beam Grades | A1 | | |
| <input type="checkbox"/> | Evaluation of Beam Grades for Decking | A1 | | |
| <input type="checkbox"/> | Preformed Pier Cap Expansion | A1 | | |

NEW BRIDGE CONSTRUCTION

Steel Beams

| | <u>ITEMS TO CHECK</u> | <u>REFERENCE MATERIAL</u> | | |
|--------------------------|--|----------------------------------|--------------------------------------|--------------------------|
| | | Check List Appendix | Specifications (Check Supplementals) | Construction Manual |
| <input type="checkbox"/> | Pertinent Documents | A1, A2, A3, A7 | | |
| <input type="checkbox"/> | Painted and Unpainted Steel | A3 | | Chapter 11 Sec. 11.32 |
| <input type="checkbox"/> | Layout for Bearing Units | A1 | | |
| <input type="checkbox"/> | Bearing Unit Anchor Bolts | | | |
| <input type="checkbox"/> | Erection of Steel Girders | A3 | | Chapter 11 Sec. 11.32 |
| <input type="checkbox"/> | Installation of Cross Frames | | | |
| <input type="checkbox"/> | Prebolting Meeting, Rotational Capacity of Fasteners | A2, A3, A7 | Section 2408 Article 2408.39D | Chapter 11 Sec. 11.32 |
| <input type="checkbox"/> | Bolting Procedures | A2, A3, A7 | Section 2408 Article 2408.39E2 | Chapter 11 Sec. 11.32 |
| <input type="checkbox"/> | Alignment | | | |
| <input type="checkbox"/> | Temperature Setting of Rockers | A1, A2 | Section 2408 Article 2408.43 | |
| <input type="checkbox"/> | Layout and Shooting of Beam Grades | A1 | | |
| <input type="checkbox"/> | Evaluation of Beam Grades | A1 | | |
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NEW BRIDGE CONSTRUCTION

Reinforcing Steel

| | <u>ITEMS TO CHECK</u> | <u>REFERENCE MATERIAL</u> | | |
|--------------------------|---|----------------------------------|---|-----------------------------|
| | | Check List Appendix | Specifications (Check Supplementals) | Construction Manual |
| <input type="checkbox"/> | Pertinent Documents | A1, A2, A3, A4, A6, A7 | | |
| <input type="checkbox"/> | Reinforcing Bar List, Bent Bar Diagram and Layout | A1 | | |
| <input type="checkbox"/> | Handling and Storage | A3, A7 | | Chapter 11 Section 11.42 |
| <input type="checkbox"/> | Bending or Straightening of Reinforcing Steel | A2 | Section 2404 Articles 2404.04, 2404.05 | |
| <input type="checkbox"/> | Repair of Damaged Coating | A2, A3 | Section 4151 Article 4151.03B | Chapter 11 Section 11.42 |
| <input type="checkbox"/> | Placement and Fastening | A2, A3, A7 | Section 2404 Article 2404.06 | Chapter 11 Section 11.42 |
| <input type="checkbox"/> | Placement and Clearance | A3, A6, A7 | | Chapter 11 Section 11.41 |
| <input type="checkbox"/> | Reinforcing Supports | A2, A3 | Section 2404 Article 2404.07 | Chapter 11 Section 11.42 |
| <input type="checkbox"/> | Materials | A4 IM 451.01 | | |
| <input type="checkbox"/> | Splicing | A2, A3 | Section 2404 Article 2404.08 | Chapter 11 Section 11.44 |
| <input type="checkbox"/> | Cleaning | A2 | Section 2404 Article 2404.03 | |
| <input type="checkbox"/> | Cutting of Reinforcing Steel | A7 | | |
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NEW BRIDGE CONSTRUCTION

Deck Grades

| | <u>ITEMS TO CHECK</u> | <u>REFERENCE MATERIAL</u> | | |
|--------------------------|--------------------------------------|---------------------------|--------------------------------------|--------------------------|
| | | Check List Appendix | Specifications (Check Supplementals) | Construction Manual |
| <input type="checkbox"/> | Pertinent Documents | A1, A2 | | |
| <input type="checkbox"/> | Survey Crew to Shoot Beam Elevations | | | |
| <input type="checkbox"/> | Calculate Grades | | | |
| <input type="checkbox"/> | Camber Haunch or Embedment Limits | A1 | | |
| <input type="checkbox"/> | Reinforcing Steel Clearance | A1, A2, A3 | Section 2412 Article 2412.04 | Chapter 11 Section 11.41 |
| <input type="checkbox"/> | Deck Thickness | A1 | | |
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NEW BRIDGE CONSTRUCTION

Concrete Placement - Substructure

| | <u>ITEMS TO CHECK</u> | <u>REFERENCE MATERIAL</u> | | |
|--------------------------|---|---|---|-----------------------------|
| | | Check List Appendix | Specifications (Check Supplementals) | Construction Manual |
| <input type="checkbox"/> | Pertinent Documents | A1, A2, A3, A7 | | |
| <input type="checkbox"/> | Concrete Mix | A1, A2 IM 529 | Articles 2301.13, 2415.03 & 2403.01 – 2403.03 | |
| <input type="checkbox"/> | Admixtures | A2, A3, A7 | Section 2403 Article 2403.03 | Chapter 11 Section 11.53 |
| <input type="checkbox"/> | Concrete Mixing and Delivery Time | A2, A3, A7 | Articles 2403.06, 2301.13D | Chapter 11 Section 11.52 |
| <input type="checkbox"/> | Concrete Testing and Modification | A2, A3, A7, IM's 204,317, 318, 327, 328 | Section 2403 Article 2403.03 | Chapter 11 Section 11.52 |
| <input type="checkbox"/> | Placing | A2, A3, A7 | Articles 2403.07, 2403.08 & 2415.04 | Chapter 11 Section 11.56 |
| <input type="checkbox"/> | Vibration | A2, A7 | Section 2403 Article 2403.09 | |
| <input type="checkbox"/> | Finishing and Keyways | A2 | Articles 2403.07, 2415.04 | |
| <input type="checkbox"/> | Protection and Curing | A2, A7 | Section 2403 Articles 2403.10 & 2403.11 | |
| <input type="checkbox"/> | Strength Requirements and Determination | A2, A7 IM 316 | Section 2403 Article 2403.19 | |
| <input type="checkbox"/> | Form Removal Surface Finish and Patching | A2, A7 | Section 2403 Article 2403.18 & 2403.21 | |
| <input type="checkbox"/> | Checking Temperature of Concrete | A3, A7 | | Chapter 11 Section 11.54 |
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NEW BRIDGE CONSTRUCTION

Concrete Placement – Bridge Deck

| | <u>ITEMS TO CHECK</u> | <u>REFERENCE MATERIAL</u> | | |
|--------------------------|---|---------------------------|--|--------------------------|
| | | Check List Appendix | Specifications (Check Supplementals) | Construction Manual |
| <input type="checkbox"/> | Pertinent Documents | A1, A2, A3 | | |
| <input type="checkbox"/> | Concrete Mix | A1, A2 | Articles 2403.01-2403.03, 2412.02 | |
| <input type="checkbox"/> | Admixtures | A2, A3 | Articles 2403.03, 2412.02 | Chapter 11 Section 11.53 |
| <input type="checkbox"/> | Concrete Mixing and Delivery Time | A2 | Section 2403 Articles 2403.06, 2301.13D | |
| <input type="checkbox"/> | Concrete Testing and Modification | A2 | Section 2403 Article 2403.03 | |
| <input type="checkbox"/> | Concrete Placement Methods | A3 | | Chapter 11 Section 11.56 |
| <input type="checkbox"/> | Placing Sequence Location of Permissible Headers | A3 | | Chapter 11 Section 11.55 |
| <input type="checkbox"/> | Placing and Evaporation Rate | A2, A3 | Articles 2403.08, 2412.05 | Chapter 11 Section 11.55 |
| <input type="checkbox"/> | Vibration | A2 | Section 2403 Article 2403.09 | |
| <input type="checkbox"/> | Surface Finish | A2 | Section 2412 Article 2412.06 | |
| <input type="checkbox"/> | Curing | A2 | Section 2412 Article 2412.07 | |
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NEW BRIDGE CONSTRUCTION

Concrete Placement – Barrier Rail

| | <u>ITEMS TO CHECK</u> | <u>REFERENCE MATERIAL</u> | | |
|--------------------------|-----------------------------------|---------------------------|---------------------------------------|-----------------------------|
| | | Check List Appendix | Specifications (Check Supplementals) | Construction Manual |
| <input type="checkbox"/> | Pertinent Documents | A1, A2, A3 | | |
| <input type="checkbox"/> | Types of Barrier Rail | A2 | Section 2513 Article 2513.01 | |
| <input type="checkbox"/> | Slip Form Barrier Rail | A3 | | Chapter 11 Section 11.72 |
| <input type="checkbox"/> | Cast in Place Barrier Rail | A3 | | Chapter 11 Section 11.73 |
| <input type="checkbox"/> | Bridge Deck Strength | A3 | | Chapter 11 Section 11.71 |
| <input type="checkbox"/> | Concrete Mix | A1, A2 | Section 2513 Article 2513.03 | |
| <input type="checkbox"/> | Admixtures | A2, A3 | Section 2513 Article 2513.02C | Chapter 11 Section 11.53 |
| <input type="checkbox"/> | Concrete Mixing and Delivery Time | A2 | Articles 2403.06, 2407.09 2301.13D | |
| <input type="checkbox"/> | Concrete Testing and Modification | A2 | Section 2513 Article 2513.03 | |
| <input type="checkbox"/> | Curing | A2 | Section 2513 Article 2513.06 | |
| <input type="checkbox"/> | Removal of Forms | A2 | Section 2513 Article 2513.07 | |
| <input type="checkbox"/> | Finish | A2 | Section 2513 Article 2513.08 | |
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NEW BRIDGE CONSTRUCTION

Expansion Joints

| | <u>ITEMS TO CHECK</u> | <u>REFERENCE MATERIAL</u> | | |
|--------------------------|--|---------------------------|--------------------------------------|--------------------------|
| | | Check List Appendix | Specifications (Check Supplementals) | Construction Manual |
| <input type="checkbox"/> | Pertinent Documents | A1, A3 | | |
| <input type="checkbox"/> | Joint Opening Distance Setting | A1, A3 | | Chapter 11 Section 11.63 |
| <input type="checkbox"/> | Surface Preparation of Concrete or Steel | | | |
| <input type="checkbox"/> | Lubricant Adhesive per Manufacture's Recommendations | | | |
| <input type="checkbox"/> | Position of Expansion Material | | | |
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NEW BRIDGE CONSTRUCTION

Appendix A – Pertinent Document List

| INFORMATION SOURCES | |
|--------------------------|---|
| <input type="checkbox"/> | A1 – Project Plans |
| <input type="checkbox"/> | A2 – Standard Specifications |
| <input type="checkbox"/> | A3 – Construction Manual |
| <input type="checkbox"/> | A4 – Instructional Memorandum (IM) Volume II |
| <input type="checkbox"/> | A5 – Surveyor's Handbook |
| <input type="checkbox"/> | A6 – Reinforcing Steel Placement Handbook |
| <input type="checkbox"/> | A7 – Bridge and Culvert Structures Inspection Training Manual |
| <input type="checkbox"/> | A8 – Bridge Standards |
| <input type="checkbox"/> | A9 – Standard Road Plans |
| <input type="checkbox"/> | A10 – Special Provisions for Concrete Drilled Shaft |
| <input type="checkbox"/> | A11 – Field Manual for Pile Driving Using the Wave Equation |

