

SUMMARY OF REVISIONS FOR JANUARY, 2011
STANDARD SPECIFICATIONS
DEPARTMENT of TRANSPORTATION



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INTRODUCTION

NEW ITEMS INCORPERATED IN 2011 STANDARD SPECIFICATION MANUAL

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|-----|-------------------------------------|
| 210 | RUMBLE STRIP |
| 262 | PARTIAL DEPTH RECYCLING |
| 263 | FULL DEPTH RECYCLING |
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| 821 | ADJUSTMENT FOR ASPHALT BINDER PRICE |
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CHANGES TO STANDARD DRAWINGS

| | |
|-------|---|
| 210-1 | Shoulder Rumble Strip (<i>Addition</i>) |
| 351-3 | Waterproofing Requirements on Box Culver or Rigid Frame (<i>Addition</i>) |
| 533-1 | Power Point Detail, Multiple Lights (<i>Revision</i>) |
| 533-2 | Power Point Detail, Single Light (<i>Revision</i>) |
| 540-3 | Type "G" Sign or Light Base Details- Soil Foundations (<i>Addition</i>) |
| 540-4 | Sign or Light Base Detail- Bedrock Foundation (<i>Renumbered</i>) |

GENERAL COMMENTS

| | |
|------------------------|---|
| renumbering | Please note that after additions and revisions were made, many of the subsequent articles may have had to be renumbered. Cross referencing numbers may also have been updated to correspond to changes. |
| his/her | Please note that any reference to "his" has been replaced with his/her or an equivalent to render the manual more gender neutral. |
| will -shall | In many Items the word "will" was replaced with "shall" to adhere to the standard wording for specifications. |
| PS | Throughout this document Particular Specifications shall be referred to as PS. |

PLEASE NOTE: *throughout the document, text in italic font indicates author's commentary on the changes and revisions made to specifications.*

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INTRODUCTION

DIVISION 000- INTRODUCTION

002- ABBREVIATIONS

002.1 *The following abbreviations were updated:*

Organizations

DENV Department of Environment (New Brunswick)

Terms

EMM Environmental Management Manual (DOT)

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GRADING

DIVISION 100- GRADING

101- CLEARING

Entire Item was replaced to reflect current regulations and to accommodate changes requested by regulators. The following will outline some of the changes, most of which will have appeared over the past few years in Particular Specifications (PS), however, please see the Item for details:

- Item geared towards Clearing-Only contracts
- More stringent environmental requirements, including most buffer zones increased to 30m.
- The Engineer shall identify clearing limits and buffer zone limits with ribbons or similar means. (101.4.1)
- Definition of Merchantable Lumber changed to "any timber for which the Contractor can find an established market in the general vicinity of the Contract". (101.1.2)

102- GRUBBING

The following articles were added to address ambiguities in the current standard.

- 102.1.2 This Item also consists of removal of shredded and/or chipped material left behind from the clearing operation done by others.
- 102.4.1.1 The Work will include dealing with stump height over 0.3 m, and with brush, slash and pieces of timber lying on the ground, due to clearing by others.
- 102.4.7 .1 Burning of grubbed materials will not be permitted.

106,107 & 108- EXCAVATION

Taking cross-sections for measure of payment after grubbing was causing problems because the ground was already disturbed, in some cases, when taking the cross section. The following revisions were also applied to articles 107.5.2, and 107.5.2.1:

- 106.5.2 The volume shall be as measured in situ and computed by the average end area method, based on "original ground" cross-sections surveyed by the Engineer on the natural ground, after grubbing.
- .1 In the areas to be grubbed, the cross-sections will be taken before grubbing, and the volume payable under this Item will include material in the grubbed layer removed under Item 102. Where grubbing is not carried out, as in swamps or other areas where excavated material will be wasted, the "original ground" cross sections will be taken on the natural surface or if cleared, on the ungrubbed surface after completion of clearing.

*Over the last few year there has been a pilot program conducted with haul-in-place contracts, and most contracts were issued with PS removing overhaul payment. As this was found to cause less disputes, and hassles **all standard contracts shall now have haulage included**, thus articles 106.6.2, 107.6.2, 108.6.2, 108.6.3, and 203.6.2 regarding overhaul payment were deleted.*

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GRADING

116- DITCHING

116.4.2 *Revised article, to allow a larger range of depths" up to a maximum of 300 mm", as 150 mm was often not sufficient to achieve positive drainage.*

The following articles were revised in order to clarify the intended construction practices:

116.4.4 The Contractor shall shape ditches to a uniform ~~width~~ cross-section, with no gouges or ridges remaining in the finished Work.

116.4.8 Driveways with a culvert designated for replacement shall be replaced in the same Day workday ~~and~~ in accordance with Item 130 and/or Item 140 utilizing material excavated from the crossing wherever possible.

116.4.8.1.3 Salvageable pipe shall be re-used in accordance with Item 130 or Item 140 in the Work Site or transported, by the Contractor, to the nearest DOT Maintenance Depot and stockpiled as directed by the Engineer.

116.4.9 *added article to address a reoccurring problem of ditches not being stabilized in a timely fashion and causing erosion and run off issues:* Ditches shall be stabilized against erosion with straw mulch, in accordance with 616.2, 616.3, and 616.4, at the end of each day's ditching.

121- BORROW

The Materials section has been revised to include a new class of borrow, A1, and rearranged to better communicate the hierarchy of borrow quality:

121.2 MATERIALS

- .1 All materials shall be supplied by the Contractor.
- .2 Borrow shall consist of soil and/or rock free of roots, stumps, organics and/or other deleterious substances, and shall meet the following requirements:
 - .1 Dust content will be determined in accordance with ASTM C117.
 - .2 Borrow A1 shall be pit run gravel, quarried or ripped rock, having a Micro-Deval loss not exceeding 50% when tested per MTO LS-618.
 - .1 Borrow A1 shall not contain more than 10% of particles passing the 75 µm sieve when tested in accordance with ASTM C136 and C117.
 - .2 Borrow A1 shall have a maximum Plasticity Index of 5.
- .3 Borrow A shall have a Dust content not exceeding 25% tested at a minimum frequency of one test per 10 000 t.
 - .1 If successive test results indicate a Dust content below 15% the test frequency may be reduced at the discretion of the Engineer.

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GRADING

- 121.2.2.3 .1 Sedimentary rock proposed for use as Borrow A shall have a Micro-Deval loss not greater than 60% when tested in accordance with Test Method MTO LS-618, A Grading, modified as follows:
- Para. 5.6- The Micro-Deval abrasion machine will run 30 minutes.
 - Para. 5.7 and 5.8- A 75 µm sieve will be added to determine Mass 'B' in the Percent Loss calculation.
- .4 Mudstone, claystone and/or siltstone will not be acceptable as Borrow A/A1.
- .5 Borrow A shall have a maximum Plasticity Index of 5.
- .6 Borrow B shall have a Dust content not exceeding 50%.
- .3 Borrow shall be subject to the approval of the Engineer at the time of placement in the Work and the maximum particle size shall not exceed two-thirds of the lift thickness being placed.

130- METAL PIPE

- 130.1.1 *revised article, as follows, to properly reflect the names of the materials used:* This Item consists of supply and installation of aluminum coated corrugated steel pipe (CSP) ~~aluminum-coated corrugated steel pipe~~-arch (CSPA) and corrugated aluminum alloy pipe (CAP), having an equivalent diameter of 1200 mm or less.
- 130.2.2.1 *added article as follows:* Bolts and nuts shall be of the same material as the pipe.

Table 130-4 Backfill Classification *was deleted same requirements in Table 167-1 referenced instead.*

- 130.2.6 Backfill material shall meet the requirements of ~~Table 130-4~~ 167.2.

131- METAL PIPE- LARGE

- 131.2.2.1 *added article:* Bolts and nuts shall be of the same material as the pipe.

Table 131-1 Material/Fabrication Standards- *The year was removed from the end of each standard referred to under "Material Standard" and " Fabrication Standard".*

140- CONCRETE PIPE

- 140.2.2 *updated article as follows to refer to a specific, more stringent, standard:* All reinforced concrete pipe shall meet the requirements of ~~either ASTM C76, ASTM C655 or CAN/CSA A257.2~~ and CAN/CSA A257.3.

141- CONCRETE PIPE- LARGE

The full Item was revised and updated after a review conducted by a consultant. The following points will outline some of the major changes, however, please see the full Item for details.

- While some requirements apply to all pipes, the pipes were separated into three categories, 1350-1800 mm ID, 2100-2700 mm ID, and greater than 3000mm ID, and the specific requirements for each category were laid out. As the ID increases, the design, fabrication, testing, and concrete requirements become more stringent.

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- Pipes with ID greater than 3000mm must be designed and analyzed in accordance with CAN/CSA-S6 (141.4.2.1)
- A research study was conducted on the design large diameter concrete pipes in accordance CSA S6-06 using Direct Design Method through PIPECAR software. A "Supplementary Design Insert" will also be included in the Particular Specifications (PS) to show the required inputs and outputs.

142- PRECAST CONCRETE BOX CULVERT

The full Item was revised and updated after a review conducted by a consultant. The following points will outline some of the major changes, however, please see the full Item for details.

- Box culverts must be designed and analyzed in accordance with CAN/CSA-S6 (142.4.2.1).
- A research study was conducted on the design of reinforced concrete box culverts in accordance CSA S6-06 using Direct Design Method through BOXCAR. A "Supplementary Design Insert" will also be included in the PS to show the required inputs and outputs.
- The supplement will specify how to properly use the US Standard Unit version of BOXCAR as the SI Unit version appears to have a conversion error, and produces unacceptable results.

167- BACKFILL FOR STRUCTURES

The following articles were added to ensure that all material used meet NBDOT standards:

- 167.4 .3 The Contractor shall advise the Engineer immediately of any changes in the source materials, at any time during the course of the Work.
- .1 Random samples shall be taken and tests conducted by the Engineer to determine the effects of the change.
 - .2 No Work shall be undertaken by the Contractor in the area of the changed conditions until an approval is received from the Engineer.

169- INDUCED TRENCHES

Table 169-1 Approved Backfill Materials: *under "Product" "Baled hay or straw (cut strings)" was deleted, because the hay was being applied as bail with strings cut but not being loosened sufficiently. The following article was also added to address this issue:*

- 169.2.2.2 Baled hay or straw shall be broken up to a loose condition before placement in the trench.

191- APPLICATION OF WATER

- 191.2.3 *added article to ensure the proper permits are obtained:* When applying for a permit for water extraction per 191.2.2, the Contractor shall ensure that the permit covers extraction of water for use under Items of the Contract.

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PAVEMENT STRUCTURE

DIVISION 200

DIVISION 200- PAVEMENT STRUCTURE

201- PRODUCTION OF HIGHWAY AGGREGATES

The following articles have been revised by adding "crushing and" before "processing" in each of the articles, as well as adding "Crushed" to the title of each subsection: 201.2.4.1.1, 201.2.4.2.1, 201.2.4.4.1, 201.2.5.1, & 201.2.6.1

Articles were revised/added as follows to reflect current DOT requirements:

201.2.4.4.1.2 Crushed sandstone shall have a maximum Plasticity Index (PI) of 5.

201.2.4.4.1.3 Crushed Sandstone proposed for use as subbase shall have a Micro-Deval loss not greater than 60% when tested in accordance with Test Method MTO LS-618, A Grading, modified as follows:

- Para. 5.6- The Micro-Deval abrasion machine will run 30 minutes.
- Para. 5.7 and 5.8- A 75 µm sieve will be added to determine Mass 'B' in the Percent Loss calculation.

203- AGGREGATE BASE/SUBBASE

The article 203.6.2 was deleted in order to make haulage included in the Item.

205- FINE GRADING

205.4.3 *revised article, as follows, to address construction issues encountered during fine grading: The fine grading material shall be compacted in accordance with Item 936 to a minimum of 95% of the maximum dry density. If paved Shoulders are specified, the Shoulders shall be fine graded to the same elevation as the top of the adjacent surface.*

210- SHOULDER RUMBLE STRIPS

New Item incorporated in 2011 edition.

259- BITUMINOUS TACK COAT

Tack coats were not leaving enough residue because SS-1 or CSS-1 binders are picked up by construction traffic. The RS-1 and CRS- 1 have more residue and set up faster and should address this issue. (SS-1 and CSS-1 to remain in PS for Full Depth Recycling Item 263). Article was revised as follows:

259.2.2 Tack coat shall be ~~SS-1 or CSS-1~~ RS-1 or CRS-1 Grade asphalt emulsion and shall conform in all respects to the provisions of ~~CAN/CGSB 16.2, Table 1~~ ASTM D977-05 and D2397-05, respectively.

259.4.7 *revised application rate based on field trials: The ~~SS-1 or CSS-1~~ RS-1 or CRS-1 emulsion shall be ~~diluted with an equal amount of water and~~ applied in a uniform manner, without streaking, at a rate of ~~0.20 to 0.30~~ 0.15 to 0.25 L/m² or as directed by the Engineer.*

259.4.10.2 *revised article as follows: The Work shall be planned so that tacked surfaces will be covered with asphalt concrete to within 200 m of the tacked length before opening the Work Area to traffic and at the end of the Day's Work.*

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260- ASPHALT CONCRETE

260.2.1.1.5 Article was revised to require one sample of asphalt binder per 10,000t, instead of one per 5,000t, as that is sufficient for quality assurance.

260.2.1.1.5.1 Article was revised to require one sample of asphalt binder per 5,000t, instead of 1,000t, as that is sufficient for quality assurance

Table 260-1 Physical Requirements for Coarse Aggregates under "Absorption ASTM C127 (Max% by Mass Retained)" for all ESALS, and for both Base and surface mix the Max % of absorption was revised to be 1.50 %.

Table 260-2 Table was revised as follows in order to establish appropriate Micro-Deval limits which were attainable. The Note was added to ensure some available rock in the Miramichi region with a low Micro-Deval % loss for coarse aggregate, but higher Micro-Deval % loss for fine aggregate, may be used:

**Table 260-2
Physical Requirements for Fine Aggregates**

| Design ESALs (Million, Based on 20 yrs) | Micro-Deval MTO LS619 (Max. % Loss) | Uncompacted Void Content of Fine Aggregate ASTM C1252 (% Min.) |
|---|--|---|
| 0.3 to < 3 | Base (22.0) Surface (18.0) | 45.0 |
| 3 to < 30 | Base (20.0) Surface (16.0 17.0) | 45.0 |
| ≥ 30 | Base (20.0) Surface (16.0 17.0) | 45.0 |
| <p style="text-align: center;"><u>Note: The allowable Micro-Deval surface Fine Aggregate shall be Max % Loss=19.0, if the Micro-Deval on Coarse Aggregate per Table 260-1 is ≤12.0, provided that the Coarse Aggregate is from the same source.</u></p> | | |

260.2.1.3.4 revised article as follows to correct a mistake: "no more than 5% of the retained material passes the ~~34.5~~ 6.3 mm sieve..."

Table 260-4 Approved Anti-stripping Admixtures AD-here 7700 and Innovalt W were added to the list of approved admixtures.

260.2.3.1.1 The binder content for B mix asphalt was changed from 5.0% to 4.8% of the total specified tonnage, because that is the standard content in practice.

260.2.3.1.1.4 The binder content for "HRB" mix asphalt was changed from 2.7 % to 3.1% of the total specified tonnage, to account for difference in binder content due to reducing the standard content of RAP in the HRB mix from 35% in the PS, to 30%.

260.2.3.2.1.1 revised article to reflect the percentage of RAP generally used in practice: The amount of RAP in a hot mixed recycled asphalt concrete mix shall be 30%±5% of the total weight of the combined materials. ~~as specified in the Contract Documents.~~

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260.2.3.2.2.1 *revised article, as follows, to refer to the specific manuals to be used:* The asphalt concrete mix design shall follow AASHTO R35 Standard Practice for Superpave Volumetric Design for Hot-Mix Asphalt (HMA), AASHTO R30-02 Standard Practice for Mixture Conditioning of Hot-Mix Asphalt (HMA) and AASHTO T312 Standard Method for Preparing and Determining the density of Hot-Mix Asphalt (HMA) specimens by means of Superpave Gyrotory Compactor. ~~the Asphalt Institute Manual Series SP-2, Superpave Mix Design. Laboratory compaction of each test specimen will be accomplished by means of a gyrotory compactor.~~

260.2.3.3.1 *revised article to clarify intent:* Sampling for DMF shall not be undertaken until, at least 50% of each aggregate type, ~~for the current year's production,~~ is produced and in stockpile.

The following articles were revised, as follows, to be applicable to all equipment as it becomes more modern:

260.4.2.10.2.1 Monitors indicating individual cold feed bin feeder speeds shall be required. ~~installed on the control panel.~~

260.4.2.10.8 .1 The system shall be equipped with automatic burner controls indicating ~~and shall provide a printed record of~~ the mix temperature at discharge.

Articles were revised, as follows, to address issues encountered in the field:

260.4.2.10.7.1 Weighing systems for weighing aggregate shall be accurate and sensitive to a tolerance of ± 0.5% ~~over the entire working range of the maximum loading required.~~

260.4.2.12.6 Longitudinal grade control shall be used on all lifts. ~~and transverse Slope controls shall be used on all lifts except surface course unless otherwise directed by the Engineer.~~

The following articles were added to ensure sufficient and fair compaction practices:

260.4.2.13.6.2.2 Paving in echelon on the driving lanes shall require the use of two pneumatic-tired rollers.

260.4.2.13.6.3.1 Use of a steel-drum finish roller on base courses shall be optional.

260.4.3.4 .4 *added article to all paving contracts in the PS beginning in 2009 to ensure paving operations are not held up while the plant is producing a mix for private contracts:* During paving operations the Contractor shall produce only asphalt concrete mix(es) in the Contract.

Table 260-10 Cut-off Dates for Paving *has been revised as follows due to warmer fall weather:*

| County | Surface mixes | Base mixes |
|---|--|--|
| Gloucester, Madawaska, Restigouche, Victoria | September 30 <u>October 07</u> | October 15 <u>October 22</u> |
| All others | October 15 <u>October 22</u> | October 31 |

Articles were revised, as follows, to address the safety issue of milled surfaces remaining unpaved, or only partially paved, for too long. These articles are cross referenced in 260.6.7, and failure to comply will result in a \$1000/day penalty:

260.4.3.7.3 The placement of the new asphalt concrete mix shall ~~take place within 7 Days of the~~ commence within 14 days of the commencement of the cold milling operation and shall continue on a daily basis until the entire milled surface has received a lift of asphalt concrete.

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260.4.3.7.4 When the RAP is being reused in a recycled asphalt concrete mix, the placement of the asphalt concrete shall commence within ~~44 Days~~ 21 days of the availability of the RAP ~~required to carry out an~~ for the asphalt concrete mix design and shall continue on a daily basis until the entire milled surface has received a lift of asphalt concrete.

260.4.3.8.18 *added article to address construction issues:* The speed of the spreader(s) shall be matched to the production of the asphalt plant to ensure continuous operation of the spreader(s).

The following subsection was rewritten to clarify what is expected for Transverse Key Joints on new asphalt and milled surfaces:

260.4.3.10.3 Transverse Key Joint

.1 When the elevation of the new asphalt concrete pavement is higher than the existing pavement, a transverse key joint shall be constructed as per Standard Drawing 260-1 between the existing and new Asphalt Concrete pavement at the beginning and at the paving limits and other locations as determined by the Engineer.

.1 If a transverse key is cut in advance of paving the joint area, the Contractor shall immediately construct with hot mixed asphalt concrete a smooth 1.5 m long taper at the joint area, as shown in Standard Drawing 260-1.

.2 Prior to the placement of the asphalt concrete, all transverse key joint surfaces shall be cleaned of loose foreign material and a tack coat applied in accordance with 259.2, 259.3, and 259.4.

.2 When the elevation of the new asphalt concrete Pavement is at the same elevation as the existing pavement, a straight vertical surface equal to the thickness of the new asphalt Pavement shall be constructed between the new lift of Pavement at the beginning and at the end of the project and other locations where the new pavement terminates against an existing pavement.

260.4.3.12.3 *revised article, as follows, to address construction issue:* Expansion joints and deck drains shall be protected from damage from Equipment passing over them.

260.4.3.13 "Temporary Pavement Markings" subsection was deleted due to the addition of Item 571 which rendered it redundant.

The following articles were revised/added as follows in order to clarify what quantities are, and are not included in the Payment Adjustment for Density:

260.4.5.1.2.1 One day's production and placement of 500 t or more of asphalt concrete, excluding the quantity used for padding and the quantity of surface mix placed in the Shoulder area where only a single lift of surface mix is placed on granular Shoulders.

260.4.5.1.2.2 One day's production and placement of less than 500 t of asphalt concrete, excluding the quantity used for padding and the quantity of surface mixed placed in the Shoulder area where only a single lift of surface mix is placed on granular Shoulders, will be evaluated as per 260.4.5.1.2.2.1 and 260.4.5.1.2.2.2. follows:

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- 260.4.5.1.6.1 The Shoulder area where only a single lift of asphalt concrete surface mix is placed over granulars, for which the Contractor shall establish a rolling pattern to achieve the maximum compaction of the asphalt concrete.
- 260.4.5.1.6.4 Padding lifts.
- 260.4.5.1.7.2 added article to allow engineer to allow coring before 12 hours using dry ice, on high volume roads where coring poses safety problems: The Engineer may allow cores to be obtained within 12 hours after asphalt concrete placement.
- 260.4.5.2.2.3 Articles addressing Profile requirement were revised as follows; "individual bumps/dips & 260.4.5.2.3.1 exceeding ~~8.5~~ 8.4 mm".
- 260.4.5.4.1.4 revised article, as follows, to address issues encountered on site of several small patch repairs to new asphalt: Repairs required to correct surface defects in accordance with per 260.4.5.3 shall be carried out for the full width of the driving lane and a minimum length of 10 m. The asphalt concrete shall be placed with a paver.
- 260.5.2.2 revised article as follows, to clarify what is and is not included in the Payment adjustment for density,: The Unit Price adjustments of Table 260-13 shall not apply to asphalt concrete placed as padding, or as a single lift of surface mix on granular shoulders or Bridge decks. For asphalt concrete placed as padding, on Shoulders where a single lift of asphalt concrete surface mix over granulars is specified and on Bridge decks, the Unit Price adjustment as shown in Table 260-13 shall not apply.
- 260.5.5 "Payment of Adjustment for Change in PG Asphalt Binder Price" subsection was deleted as "Attachment A" has become Item 821.

The following articles were revised as follows to ensure a clear and fair arrangement for payment of asphalt binder content quantity adjustments:

- 260.6.2.1 If the actual asphalt binder content is less than the assumed binder content, the Contractor shall reimburse the Owner using MTO's PG asphalt binder price index for the Month preceding the month of the tender opening. Payment to the Contractor will be made for asphalt binder content in excess of the assumed asphalt binder content specified in 260.2.3.1 for the total payable tonnage.
- 260.6.2.2 If the actual asphalt binder content is higher than the assumed binder content, the Owner will reimburse the Contractor the actual invoiced amount supplied by the Contractor. Credit shall be given to the Owner for all asphalt binder content below the assumed asphalt binder content specified in 260.2.3.1 for the total payable tonnage.
- 260.6.2.3 Payments and credits shall be determined upon completion of the Work. Payments and credits will be based on the actual price per tonne as invoiced to the Contractor by the supplier for the Work.
- ~~260.6.2.4 Payments and credits will be determined upon completion of the Work.~~
- ~~260.6.2.5 This determination is independent from and has no relationship to calculations for determining Unit Price adjustments as determined under 260.5.~~
- 260.6.3 added article to indicate the re-location of "Attachment A" to Item 821: Payment adjustment for change in the PG asphalt binder price will be calculated in accordance with Item 821.

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260.6 .7 *the following article has been issued in PS since 2009 (and revised in 2010) to ensure that milled surfaces are paved in a timely manner for safety: For each occurrence that paving is not performed per 260.4.3.7.3 or 260.4.3.7.4, the Contractor shall pay the Owner a penalty of \$1000 for each Day after the 14th Day, or 21st Day, respectively, until paving commences; and \$1000 for each Day that paving is not continuous (stopped on any Day for more than 40% of the Contractor's normal Work hours), until paving resumes.*

261- ASPHALT CONCRETE- END RESULT SPECIFICATION (ERS)

*The following revisions were made to **Table 261-1, Superpave Asphalt Concrete Mix Requirements:***

- **"Physical Requirements for Asphalt Concrete" under "Air Void %", the range has been changed to "3.0-5.0" for all Asphalt Types.**
- **"Physical Requirements for Coarse Aggregates" under "Absorption ASTM C127(Max% by Mass Retained)" for all ESALS, and for both Base and surface mix the Max % of absorption was revised to be 1.50 %.**
- **"Physical Requirements for Fine Aggregates" under "Micro-Deval % (max) MTO LS - 619" for Type C and Type D the limit was changed from 16.0% to 17.0%.**
- *The following note was added to the table: **Note:** The allowable Micro-Deval surface Fine Aggregate shall be Max % Loss=19.0, if the Micro-Deval on Coarse Aggregate is ≤12.0, provided that the Coarse Aggregate is from the same source.*

261.2.1.3.6 *added article to ensure proper moisture content in asphalt mixes: Washed materials shall be stockpiled for at least 24 hours to allow free water to drain from the aggregate and to allow the material to attain uniform moisture content.*

Table 261-2 Approved Anti-stripping Admixtures AD-here 7700 and Innovalt W *were added to the list of approved admixtures*

The following adjustments were made to the Bidder's assumed binder content for Asphalt Concrete mixes to match Item 260:

261.2.2.1.1 .1 Asphalt Concrete "B":4.8% ~~5.0%~~ of the total specified tonnage.

261.2.2.1.1 .4 Asphalt Concrete "HRB":3.1% ~~2.7%~~ of the total specified tonnage.

261.2.2.2.2 .1 *revised article, as follows, to refer to the specific manuals to be used: The asphalt concrete mix design shall follow AASHTO R35 Standard Practice for Superpave Volumetric Design for Hot-Mix Asphalt (HMA), AASHTO R30-02 Standard Practice for Mixture Conditioning of Hot-Mix Asphalt (HMA) and AASHTO T312 Standard Method for Preparing and Determining the density of Hot-Mix Asphalt (HMA) specimens by means of Superpave Gyratory Compactor. ~~the Asphalt Institute Manual Series SP-2, Superpave Mix Design. Laboratory compaction of each test specimen will be accomplished by means of a gyratory compactor.~~*

.1 The asphalt concrete mix design, at the Design Asphalt Content, shall meet the requirements in Table 261-1 for the Asphalt Concrete Mix Type specified.

.2 *revised article to reflect the percentage of RAP generally used in practice: The amount of RAP in the hot mixed recycled asphalt concrete base mix shall be ~~as specified in the Contract Documents~~ 30%±5% of the total weight of the combined materials.*

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The following articles were added as requirements for submission for Approval of Mix Design to ensure samples are representative of the material used in the asphalt concrete:

- 261.2.2.2.3.2.1 Sampling of the aggregates for the DMF for the asphalt concrete mix production for the year shall not be undertaken until:
 - .1 At least 30% of each aggregate type is in stockpile, when the tendered Quantity for the mix designation is less than 10 000 t; or
 - .2 At least 2 000t of each aggregate type is in stockpile, when the tendered Quantity for the mix designation exceeds 10 000t.
- 261.2.2.2.4.2.1 *The limit of difference between the JMF and DMF for material passing the 4.75mm sieve was changed from ±5% to ±3%.*
- 261.4.2.4.6 *revised article as follows: Longitudinal grade control shall be used on all lifts and transverse. Slope controls shall be used on all lifts except surface course unless otherwise directed by the Engineer.*

The following articles were added to ensure sufficient and fair compaction practices:

- 261.4.2.5.1.2.2.2 Paving in echelon on the driving lanes shall require the use of two pneumatic-tired rollers.
- 261.4.2.5.1.3.1 Use of a steel-drum finish roller on base courses shall be optional.

The use of a Material Transfer Vehicle (MTV) shall now be required for all ERS contracts, and thus there will no longer be a \$3.00/t adjustment paid to the Contractor. The following articles were revised/deleted as follows to reflect this change:

- 261.4.2.6.1 Material transfer vehicles shall be used for placement of asphalt concrete, and shall be self-propelled equipment capable of transferring asphalt concrete from the hauling equipment into the paver, and shall have the following characteristics:
- 261.4.2.6.2 ~~The Contractor has the option of using a material transfer vehicle for the placement of all asphalt concrete, with compensation per 261.5.4 herein.~~

Please Note: The use of MTVs are mandatory for all 260 arterial and collector contract exceeding 5000 tonnes, but will addressed through PS.

- 261.4.3.3.6 *added article to all paving contracts in the PS beginning in 2009 to ensure paving operations are not held up while the plant is producing a mix for private contracts: During paving operations the Contractor shall produce only the asphalt mix(es) identified in the Contract.*

Table 261-3 "Cut-off Dates for Paving" has been revised, as follows, due to warmer fall weather:

| County | Surface mixes | Base mixes |
|--|--|---------------------------------|
| Gloucester, Madawaska, Restigouche, Victoria | September 30 <u>October 07</u> | October 22 <u>15</u> |
| All others | October 22 <u>15</u> | October 31 |

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Articles were revised, as follows, to address the safety issue of milled surfaces remaining unpaved, or only partially paved, for too long. These articles are cross referenced in 261.6.6, and failure to comply will result in a \$1000/day penalty:

261.4.3.5 .3 The placement of the new asphalt concrete mix shall ~~take place~~ commence within 14 Days ~~7 Days~~ of the commencement of the cold milling operation and shall continue on a daily basis until the entire milled surface has received a lift of asphalt concrete.

.4 When the RAP is being reused in a recycled asphalt concrete mix, the placement of the asphalt concrete shall commence within 21 Days of the availability of the RAP required to carry out an asphalt concrete mix design and shall continue on a daily basis until the entire milled surface has received a lift of asphalt concrete.

261.4.3.6.18 *added article to address construction issues:* The speed of the spreader(s) shall be matched to the production of the asphalt plant to ensure continuous operation of the spreader(s).

The following subsection was rewritten to clarify what is expected for Transverse Key Joints on new asphalt and milled surfaces:

261.4.3.8.3 Transverse Key Joint

.1 When the elevation of the new asphalt concrete pavement is higher than the existing pavement, a transverse key joint shall be constructed as per Standard Drawing 260-1 between the existing and new Asphalt Concrete pavement at the beginning and at the paving limits and other locations as determined by the Engineer.

.1 If a transverse key is cut in advance of paving the joint area, the Contractor shall immediately construct with hot mixed asphalt concrete a smooth 1.5 m long taper at the joint area, as shown in Standard Drawing 260-1.

.2 Prior to the placement of the asphalt concrete, all transverse key joint surfaces shall be cleaned of loose foreign material and a tack coat applied in accordance with 259.2, 259.3, and 259.4.

.2 When the elevation of the new asphalt concrete Pavement is at the same elevation as the existing pavement, a straight vertical surface equal to the thickness of the new asphalt Pavement shall be constructed between the new lift of Pavement at the beginning and at the end of the project and other locations where the new pavement terminates against an existing pavement.

261.4.3.11 "Temporary Pavement Markings" subsection was removed as Item 571 has rendered it redundant.

261.4.4.2.1 *The submission of an "Inspection Testing Plan" shall now be "upon request."*

Articles 261.4.4.3.3 & 261.4.4.3.3.1 were deleted from the Item as they were negative statements.

261.4.5.1.4.2 *revised article as follows to clarify the intent:* The Engineer ~~shall~~ will be responsible for the labelling label the loose samples, storing, and the Contractor shall transport transporting of the loose samples them to the Owner's laboratories.

261.4.5.1.10.1.1 *added article as follows:* An Appeal is required before the Outlier Test applies.

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- 261.4.5.2.1 & 261.4.5.2.3 *The word "Compaction" was replaced with "Density" for consistency and clarity.*
- 261.4.5.2.6 *revised article, as follows, as cores can now be taken prior to 12 hours with the use of dry ice: Cores shall be obtained in accordance with ASTM D5361, within a minimum of 12 hours and a maximum of 24 hours after the placement of the Lot.*
- 261.4.5.4.2.3 *Articles addressing Profile requirement were revised as follows; "individual bumps/dips & 261.4.5.4.3.1 exceeding ~~8.5~~ 8.4 mm".*
- 261.4.5.5.1.2 *Article has been revised to one asphalt binder sample per 10 000t of asphalt concrete mix production is requires, as opposed to per 5000 t.*
- Table 261-5 "Acceptance/Rejection Requirements by Lot"** *has had the following revisions to Note b) to address problems with too much dust in asphalt:*
- b) If the average of Lot test results for the 75 µm sieve size exceeds 6.5%~~the upper gradation limit of Table 261-4~~, the following will apply:
- ~~Exceeds by ≤ 1.0%,~~ 6.6% to 7.5% the Lot Payment will be reduced by \$5.00/t;
 - ~~Exceeds by > 1.0%, > 7.5%~~, the Lot will be rejected.
- 261.4.5.8.4.4.1 *added article to clarify current procedure: Air void appeal testing shall be conducted at the Owner's Central Laboratory in Fredericton. The Contractor shall deliver the Air Voids appeal samples to the Owner's Central Laboratory in Fredericton.*
- 261.4.5.9.1.4 *revised article, as follows, to address issues encountered on site of several small patch repairs to new asphalt: Repairs required to correct surface defects in accordance with per 261.4.5.7 shall be carried out for the full width of the driving lane and a minimum length of 10 m. The asphalt concrete shall be placed with a paver.*
- 261.5.3.1 *revised article to correct an error: The payment adjustment for smoothness shall be as shown in Table 261- ~~8~~ 9.*
- 261.5.3.3 *revised article, as follows: Payment adjustments for smoothness per Table 261-9 and bump/dip penalties per Table 261-10 ~~Penalty or bonus assessments for Profile Index readings shown in Table 261-8 and the bump and dip penalties shown in Table 261-9~~ will be based on test results following the Contractor's final corrective efforts.*
- Table 261-8 "Unit Price Adjustment for Gradation (UPAg)"** *the notes were revised, as follows, to better enforce dust limits in the asphalt:*
- (b) If the average of Lot test results for the 75 µm sieve size exceeds 6.5%, the following will apply:
- 6.6% to 7.5% the Lot Payment will be reduced by \$5.00/t;
 - >7.5%, the Lot will be rejected.
- 261.5.4 *"Payment Adjustment for Use of Material Transfer Vehicle" subsection was deleted because it is now required for ERS contracts and thus, will not be paid on top of the unit price.*
- 261.5.5 *"Payment Adjustment for Change in PG Asphalt Binder Price" subsection was deleted as "Attachment A" will now be **Item 821**.*

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The following articles were revised as follows to ensure a clear and fair arrangement for payment of asphalt binder content quantity adjustments:

- 261.6.2.1.2 If the actual asphalt binder content is less than the assumed asphalt binder content, the Contractor shall reimburse the Owner using the MTO's PG asphalt binder price index for the month preceding the month of the tender opening. Credit shall be given to the Owner for all asphalt binder content below the assumed asphalt binder content for the total payable tonnage.
- 261.6.2.1.3 If the actual asphalt binder content is higher than the assumed asphalt binder content, the Owner will reimburse the Contractor at the actual invoiced amount supplied by the Contractor. Payments and credits will be based on MTO's PG asphalt binder price index for the month preceding the month of the tender opening. the actual price per tonne as invoiced to the Contractor by the supplier for the Work.
- 261.6.3 *added article to indicate the re-location of "Attachment A" to Item 821: Payment adjustment for change in the PG asphalt binder price will be calculated in accordance with Item 821.*
- 261.6.6 *the following article has been issued in PS since 2009 (and revised in 2010) to ensure that milled surfaces are paved in a timely manner for safety: For each occurrence that paving is not performed per 261.4.3.5.3 or 261.4.3.5.4, the Contractor shall pay the Owner a penalty of \$1000 for each Day after the 14th Day or 21st Day, respectively, until paving commences; and \$1000 for each Day that paving is not continuous (stopped on any Day for more than 40% of the Contractor's normal Work hours), until paving resumes.*

262- PARTIAL DEPTH RECYCLING

New Item incorporated in 2011 edition.

263- FULL DEPTH RECYCLING

New Item incorporated in 2011 edition.

264- MICROSURFACING

New Item incorporated in 2011 edition.

265- CHIP SEAL (SINGLE AND DOUBLE)

New Item incorporated in 2011 edition.

266- RESHAPING AGGREGATE BASE/SUBBASE

The entire Item has been deleted from the Standard Specification Manual as it is seldom used. It shall become a 700 Division Library Item to be included in the PS when necessary.

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DIVISION 300- STRUCTURES

301- PORTLAND CEMENT CONCRETE

The Material (301.2) and Construction (301.4) section of this Item have been rewritten to reflect the changes to CSA standards and to be consistent with Item 302. The following points will outline some of the major changes, however, please see the full Item for details.

- Supplementary Cementing Materials (SCMs) are defined.
- To account for the potential for some SCMs to retard strength development, no loads shall be applied to new concrete including vibration until the concrete has attained a minimum compressive strength of 10 MPa. (301.4.1.3).
- No water is to be added after batching without Engineer approval, and slump is to be controlled with superplasticizer. (301.4.5)
- Steel floats are no longer permitted, only wood or magnesium. (301.4.6.3)

302- CONCRETE IN STRUCTURES

Item 302 has been completely reviewed. Changes were made to reflect changes to the CSA standards, and to address specific problems that have occurred during construction. The new CSA standard deals more with supplementary cementing materials (SCMs) such as Fly Ash, and Silica Fume, etc. As mixes become more complex, it is important to understand the material, its limitations, and requirements.

The following articles were revised/added to better define where each type of concrete is to be used:

- 302.1.2.1.1.1 Concrete for use in integral bridge abutment, as indicated in the Contract Documents.
- 302.1.2.2.1 Concrete for use in buried Bridge abutment approach slabs.
- 302.1.2.4.1 Concrete for use in Bridge deck slabs including but not limited to, diaphragms, barrierwalls, safety-curbs, sidewalks, at grade approach slabs, and other integral deck components.
- 302.1.2.4.1.1 Concrete for use in decks in integral abutment bridges, as indicated in the Contract Documents.

The following addition is the CSA definition of Supplementary cementing materials (SCMs):

.4 Definitions

- .1 The following words and phrases, wherever used in this Item, shall have the meaning ascribed to them in CSA A3001:
 - .1 Blended Hydraulic Cement;
 - .2 Supplementary Cementing Materials;
 - .3 Blast- furnace slag;
 - .4 Blended Supplementary Cementing Materials;
 - .5 Fly Ash.

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Petrographic examination of aggregates is important to avoid Alkali- Silica Reaction (ASR) and other serious concrete problems. Articles were revised to the following to ensure consistency of sources over a number of years, as well as address issues with multiple years' worth of aggregate being crushed and stockpiled at one time:

- 302.2.2.1 .4 Petrographic examination of the aggregates shall be made on an annual basis in accordance with CSA A23.2-15A and as described below.
- .1 A Petrographic examination of the aggregates shall be initiated where there is an observed change in the material at the pit or quarry.
 - 2 When the size of the crushing operation or the usage of material from that operation is such that more than two years supply is stockpiled, the Contractor may submit a request for an extension to the time requirement for the petrographic test. The request for extension shall include details of inventory management and time period requested as a minimum.
 - .3 The petrographic examination shall detect the presence of deleterious shale, mica, coated grains, soft flaky particles, chert, and all deleterious substances which are known to cause harmful reactions in Portland cement concrete mixtures. The maximum PN for coarse aggregate shall be reported.
 - .4 The aggregate petrographer will be responsible to describe each rock type present in an aggregate sample and to comment on the unfavourable effects of any material which is known to be deleterious
 - .5 When the sample has been found to possess properties or constituents that are known to have specific unfavourable effects on concrete, those properties or constituents shall be described qualitatively and, to the extent practicable, quantitatively.
 - .1 Additional testing shall be necessary to prove the aggregate shall have no deleterious effect on concrete.

The following articles were added to ensure that SCMs, used more frequently in mixes, are properly accounted for in the mix design:

- 302.2.2.4.2 Water-to-cementing materials ratio shall be computed using the weight of cementing materials that is equal to the total weight of cement plus fly ash, silica fume, and slag.
- 302.2.2.5.2 Any admixtures which increase the water-to-cementing materials ratio by 0.01 or greater shall be accounted for in the mix design to meet the specified water-to-cementing ratios.
- 302.2.2.6.2 *Article was deleted and the subsequent two articles renumbered accordingly.*
- 302.2.2.6.1 *article revised to include absorptive mat:* Burlap, absorptive mat, or non-woven geotextile shall be used for curing horizontal surfaces
- 302.2.2.6.4 *added following article:* Curing water shall be free of chlorides, oils, dirt and other deleterious materials.

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The following subsection was replaced with updated requirement to correspond to current CSA:

302.2.2 .7 Cement And Supplementary Cementing Materials

.1 Fly ash, slag, and silica fume may be used:

- .1 On flatwork concrete exposed to chlorides and freezing and thawing, the proportions shall be limited to 20%, 35%, and 8% respectively. Total replacement shall not exceed 35%.
- .2 On formwork concrete exposed to chlorides and freezing and thawing, the proportions shall be limited to 30%, 50%, and 8% respectively. Total replacement shall not exceed 50%.
- .3 Higher replacement proportions may be permitted at the discretion of the Engineer.

302.2.3.1.1 *Article was deleted and the subsequent two articles renumbered accordingly.*

302.2.3.1.3 *revised article, as follows: A calcium nitrite corrosion inhibitor shall be added to all concrete in the abutments above the elevation of the Bridge seat, bearing blocks, and at grade approach slabs overlaid directly with asphalt concrete (excluding approach slabs buried below grade) and to concrete in the Superstructure.*

302.2.3.1.3.3 *revised article, as follows: The corrosion inhibiting calcium nitrite admixture shall be manufactured by a firm with a minimum of five years infield experience in the use of corrosion inhibitors for concrete and shall contain between 30% to 36% calcium nitrite by weight of solution.*

The associated materials list was causing many claims disputes, because anything not specifically included in the list was being claimed for. Initially a list was necessary to show what associated materials included, however that is no longer necessary. Consensus was to delete the list in favour of the following article:

302.2.4.1 The Contractor shall supply any associated materials necessary for construction, as shown on the Contract Documents.

302.3.1.1 *Articles 302.3.1.1 and 302.3.1.1.1 were deleted because the use of low alkali cement has been discontinued.*

302.3.1.2 *revised article, as follows, to ensure sufficient time for testing a new source: Proposed sources of aggregates and test results shall be submitted to the Engineer, in writing, a minimum of 14 Days prior to the proposed use of such materials. This notification period shall be increased to a minimum of 35 Days if the aggregates proposed for use have not been previously approved for use in the Owner's projects.*

The following articles were revised because exposure class C-XL in CSA requires hardened air, strength and permeability tests:

302.3.1.4 .3 The proposed design mix proportions, certified by the Contractor or his/her agent, and stamped and signed by a Professional Engineer registered or licensed to practise in the Province of New Brunswick shall be submitted at least 14 Days before concrete production is due to commence, and shall include:

- .1 Specified hardened properties and age of testing for strength, air, and permeability.

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There have been issues onsite of not receiving the proper mix, and with unauthorized addition of water to the concrete. The following subsection was added to address those issues:

302.4.2 .3 Delivery

.1 The batch delivery ticket meeting the requirements of CSA A23.1 shall accompany each batch of concrete delivered to site.

.1 The batch ticket shall include quantities of materials batched.

.2 Addition of Water

.1 Water shall not be added after batching for any purpose without the approval of the Engineer.

.1 Slump adjustment of superplasticized concrete shall be with admixture only.

302.4.4.1.1 *Article was deleted subsequent articles renumbered.*

302.4.4.1.4 *revised article, as follows, to ensure temperature of concrete is taken into account in order to avoid thermal cracking: The Contractor shall determine required delivery temperature of concrete to satisfy the selected construction method and temperature control, but concrete temperatures from the time of batching until final placing shall be maintained between 10 °C and 25 °C, unless otherwise authorized in writing.*

In the following articles, strength requirements were added to time requirements due to the increased use of SCMs, as use of some can retard strength development of the Concrete:

302.4.4.3 .3 Concrete in columns shall be allowed to cure a minimum of 36 hours and to a minimum compressive strength of 20 MPa before adjacent formwork is placed.

302.4.4.6 .1 All diaphragm concrete, with the exception of continuous pier diaphragms for Bridges with prestressed girders that are made continuous for live load and integral abutment diaphragms, must have attained 60% of its minimum specified compressive strength, prior to placing the concrete for the deck slab or any other superimposed dead loads.

302.4.4.6 .3 The deck slab concrete must have attained 80% of its minimum specified compressive strength prior to the placement of curb, barrierwalls or Sidewalk concrete or any other superimposed dead load on the deck slab.

.1 Bulkheads for the deck slab placement shall remain in place for at least 36 hours and until the deck slab concrete reaches a minimum compressive strength of 20 MPa following the initial set of the deck slab concrete.

.1 No disturbance of the embedded reinforcing shall occur until a minimum compressive strength of 20 MPa is achieved.

302.4.4.10 *"Multi-span Steel" was added to the name of the following section was changed to better reflect intent : Multi-span Steel Girder Bridges*

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The tremie concrete articles have been reviewed, and renumbered as follows, to address reoccurring construction issues:

302.4 .5 Tremie Concrete

- .1 The Contractor, in conjunction with the concrete supplier, shall plan all aspects of underwater concrete placement including mix design, contingencies, monitoring and test placements, in accordance with ACI 308, CSA A23.1, and the following minimum requirements:
 - .1 Tremie pipes shall be kept filled with concrete while depositing and shall have a maximum spacing of 3.0 m.
 - .1 A concrete pump shall not be permitted as a means of tremie concrete placement.
 - .2 During placing, the upper surface of the concrete must be kept as level as possible and particular care must be taken to ensure that the tremie concrete has a reasonably smooth and level upper surface within ~~+150 mm or -50 mm~~ +200 mm or -100 mm of the elevation designated in the Contract Documents.

302.4.5.3.3 Should such ~~samples~~ cores identify defects or fail to meet the Specifications, the Contractor shall at his own expense, carry out corrective measures, subject to the approval of the Engineer, to remedy the deficiencies identified in the structural tremie concrete.

- .1 The contractor shall be responsible, at her/his own expense, for the cost of any additional coring to determine the full extent of the defects and to develop a remediation plan satisfactory to the Engineer.

The intent of the following subsection was to address larger areas that do not meet tolerances; however the wording was for local repairs for smaller things, such as footprint depressions. The articles have been revised, as follows, to reflect the intent:

302.4.7 .6 Deck Surface Repairs to Meet Tolerances

- .1 Areas outside of tolerances identified in Table 302-3 shall be repaired as directed by the Engineer.
 - .1 It will not be acceptable to achieve this repair by placing grout or concrete over deck concrete that has hardened.

The following articles were revised, as follows, to give frequency with which to monitor the screeding operation, as on site the monitoring was found to be insufficient:

302.4.7.7 .3 After the concrete has been placed, spread and consolidated to provide a uniformly dense slab, the surface shall be struck off immediately by the passage of the screeding machine.

- .1 The screeding machine shall carry sufficient concrete in front of the screed to fill low porous places.
- .2 The Contractor shall verify the top cover on the reinforcing steel and the thickness of the deck slab across the deck within 3 m of the screeding operation at a maximum of 2 m intervals .
 - .1 If the top cover or the thickness of deck slab does not meet tolerances the screeding operation shall be repeated.

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302.4.7.7.3 .3 The screeding operation shall be repeated as may be necessary to produce a uniformly consolidated, dense, and smooth surface true to the lines and grade.

.4 The final deck finish shall be obtained by methods approved by the Engineer.

302.4.8.3.1 *added a strength requirement due to potential for SCMs to retard strength development: The curing period for concrete shall be for a minimum of 7 Days from the completion of concrete placement and until 70% of the specified strength is attained.*

*Added this article as curing is very important to strength development of concrete and quality of material. **Since it is not possible to regain the strength lost during improper curing, this clause is cross referenced in a \$1000 per occurrence penalty article to ensure it complied with:***

302.4.8.3.1.1 Wet curing shall be carried out by means of ponding, continuous sprinkling, absorptive mat, or fabric kept continuously wet.

302.4.8.3.3 *"absorptive mat" was added to the list of materials.*

302.4.8.4 *revised article to clarify that the equipment must actually be on site prior to placement: Equipment and materials necessary for curing and protection of concrete shall be available on the Worksite and ready for use before ~~actual placing is started~~ placement of concrete commences.*

302.4.8.9.2 *added article as filter fabric was being used on vertical surfaces, which does not work due to lack of retention of moisture: For vertical surfaces, curing shall be carried out by securing wet burlap against the vertical surface, supplying a continuous source of moisture to the burlap, and sealing with plastic.*

302.4.9.3.2 *revised article, as follows, to ensure full thawing of forms and the ground below them: Formwork, existing concrete at a construction joint, and reinforcing steel shall be free of ice and snow and shall be preheated to and maintained at a temperature of not less than 5 °C for a minimum period of 24 hours prior to placement.*

302.4.9.7.1 *revised article, as follows to avoid thermal cracking issues: After completion of the specified curing period the temperature of the concrete shall be gradually reduced, at a rate not to exceed 5 °C per hour, to that of the surrounding air. The temperature differential between ambient air temperature and the concrete shall not exceed 20 °C.*

The following articles were revised, as follows, to ensure a barrier wall reference panel is approved by the Engineer and may be cast in place on the structure with Engineer approval:

302.4.11.1.3 The Contractor shall cast, for a barrierwall, a site reference panel 3 m in length.

.1 The reference panel shall be cast separate from the Structure.

.1 With the approval of the Engineer this 3m reference panel may be cast in place on the Structure. No further barrier walls shall be placed until this is accepted. If this reference panel is not accepted it shall be removed and replaced at the Contractor's own expense.

.2 The panel shall be cast in the same orientation, with the same formwork material and reinforcing that shall be incorporated into the Work.

.3 The panel shall be cast with the same concrete mix and method of placement, curing and protection that shall be applied for the barrierwalls.

.1 The surface finish shall be reviewed for approval by the Engineer.

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- 302.4.11.1.3 .4 Once the reference panel is accepted, it shall remain on-site for the purpose of comparison in assessing compliance of the high quality finish for the barrierwalls.
- .5 The Contractor shall be responsible for the removal and disposal of the site reference panel, outside of the Work Site.

302.4.11.2 *The "Defects" subsection was renamed, as follows, to ensure that intent of all hardened concrete defect specification is clear: Defects Formed Surfaces*

As article 302.4.7.6 addresses larger areas that fail to meet tolerances, the following subsection was added to clarify the required actions for smaller, isolated, local defects, such as footprints.

302.4.11 .3 Defects Bridge Deck

- 1 Isolated local depressions less than 5 mm deep shall be removed by grinding the adjacent area, provided the specified cover is maintained.
 - .1 If removal of the depression by means of grinding cannot be carried out while maintaining specified cover then the affected area shall be repaired per 302.4.11.3.2.
- .2 Isolated local depressions more than 5 mm deep shall be removed and replaced as follows:
 - .1 If the depression has an area less than 0.03 m² then the affected area shall be saw cut, chipped, and patched with an Engineer approved repair material.
 - .2 If the depression has an area greater than 0.03 m² then the affected concrete shall be removed and replaced per Item 372.4.2 as directed by Engineer.
- .3 Isolated local defects less than 25 mm in diameter and less than 5 mm deep may be filled with an Engineer approved product compatible with the waterproofing system.

The following subsection was added to address poor finishing techniques and to ensure more consistent uniform surfaces:

302.4.11 .6 Bridge Deck Surface Preparation

- .1 The entire deck shall be shot blasted, and/or using equivalent means, achieve an anchor profile which is clean of all foreign materials, such as asphalt, oil, grease, and is free of any sharp protrusions and of laitance.
- .2 The final concrete surface profile shall range between a CSP 1 and a CSP 5 as defined by the International Concrete Repair Institute (ICRI) Technical Guideline No. 03732.
 - .1 Surface profile shall not interfere with the adhesion of the waterproofing membrane to the concrete deck.
 - .1 Contractor shall submit a repair procedure to the Engineer for approval of areas that are noncompliant.
- .3 Areas where rapid setting patching materials have been approved for use by the Engineer shall be cured for minimum of 72 hours, or longer when recommended by the product manufacturer's written specifications, prior to applying primer or installing membrane.

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- 302.4.11.6 .4 The entire surface shall then be swept and cleaned by pressure washing and oil-free compressed air, to the satisfaction of the Engineer.
- .5 Deck surface shall be allowed to dry for a minimum of 7 Days after cessation of curing and in accordance with the waterproofing manufacturer's written specifications, prior to applying membrane.

As the use of SCMs increases the mix design and proper use of concrete has become more complicated, and it is important to understand and take steps to ensure the quality of concrete provided. Thus, the following section has been revised to give the Contractor more responsibilities and accountability:

302.4 .12 Quality Testing

302.4.12 .1 General

- .1 The Contractor shall provide and maintain adequate facilities for safe storage and proper curing of concrete test specimens on the project site for the initial curing period.
- .2 Facilities shall be provided by the Contractor, for the Engineer to inspect all ingredients and processes used in the manufacture and delivery of concrete.
- .3 The Contractor shall carry out Quality Control sampling/testing during the concrete placement, including air, temperature, and slump testing.
- .1 Results of Quality Control tests shall be recorded and made available to the Engineer.
- .2 Tests shall be conducted by personnel certified under ACI Concrete Field Testing Technician Grade 1, or CSA A283.
- .4 Test specimens shall be sampled in accordance with CSA A23.2-1C and made and cured to meet the requirements of CSA A23.2-3C.
- .1 Samples shall be obtained at final point of discharge unless otherwise specified by the Engineer.

302.4.12 .2 Air & Slump Testing of Plastic Concrete

- .1 The air content of each load, or batch, of concrete shall be tested until consistent and acceptable air content is established, at which point testing frequency may be reduced, at the discretion of the Engineer. Should a test fail to meet the requirements, the frequency of testing shall return to one test per load, or batch, until acceptable air content consistency is re-established.
- .2 The Owner shall carry out Quality Assurance testing
- .1 If the measured slump or air content falls outside the limits specified, a check test shall be made immediately on another portion of the same sample.
- .1 This concrete load, in the event of a second failure, shall be considered to have failed to meet the requirements of this specification, and shall be rejected.
- .3 Density and Yield tests shall be made, as required by the Engineer, to meet the requirements of CSA A23.2-6C.

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302.4.12 .3 Age of Compressive Strength Testing

- .1 The Contractor shall determine the age of test and shall be indicated on the submitted concrete mix design.
 - .1 In the absence of a Contractor initiated request, the age requirements stipulated in CSA A23.1 for the specified exposure class shall apply.
 - .2 Strength tests shall be performed at 7 days, 28 days, 56 days, and 91 days.
 - .1 The 56 day or 91 day strength test may be removed if the submitted age of test request is less.

.4 Frequency of Compressive Strength Testing

- .1 Frequency of compressive strength testing shall conform to the schedule indicated in Table 302-4 and per 302.4.12.3.
- .2 For each age of compressive strength test (7, 28, 56 & 91 Days) two tests, as defined in 302.4.12.3.1, shall be required, unless indicated on submittal.
 - .1 A test, as defined in 302.4.12.7.1 to be broken at the specified age submitted with the mix design.

**Table 302-4
Frequency of Compressive Strength Testing (Concrete)**

| Number of Cubic Metres in Placing Operation | Minimum No. of Trucks to be Tested |
|--|------------------------------------|
| up to 50 | 2 |
| 51 - 100 | 3 |
| 101 - 200 | 4 |
| over 200 | See Note 1 |
| Note 1 An additional test shall be taken for each additional 100 cubic metres of concrete placed. | |

.5 Hardened Air Void Testing Frequency

- .1 A minimum of two cylinders shall be taken for hardened air void testing from each placement and cured for a minimum of 7 Days.
 - .2 The hardened air void testing shall be carried out by the Owner.

.6 Permeability Testing Frequency

- .1 A minimum of two cylinders shall be taken for permeability testing from each placement and cured for a minimum of 56 Days.
 - .2 The permeability testing shall be carried out by the Owner.

In the prior version of this Item when concrete was noncompliant, removal was required. However, in the field there were sometimes more suitable solutions. The following revisions give the Contractor the option to choose whether attempt remedial measures, depending of the severity of the noncompliance. If the remedial measures are acceptable, the concrete in the noncompliant component would be paid at a reduced unit price, or, the Contractor can opt to replace it and be paid the full unit price:

302.4.12 .7 Compressive Strength Testing

- .1 Strength tests shall mean the average strength of two-companion 150 mm by 300 mm or three companion 100 mm by 200 mm test cylinder specimens taken from the same batch and tested at the same age.
- .2 Test specimens shall be tested at the age of test submitted with concrete mix design, unless otherwise approved by the Engineer, and shall meet the requirements of CSA A23.2-9C.
- .3 To meet the strength requirements of this Item, the average of all tests shall exceed the specified strength.
 - .1 When three or more tests of the same type of concrete are available, the average of any three consecutive tests shall be equal to or greater than the specified strength, and no individual test shall be less than 90% of the specified strength.
 - .2 Concrete that does not meet specified strength shall be subject to Payment Adjustment per 302.5.7.
- .4 If tests indicate that concrete in a placement does not meet the specified strength, the concrete in that placement shall be deemed noncompliant.
 - .1 Depending upon the severity of the noncompliant concrete, the Engineer may require complete removal, or:
 - .1 The Contractor may submit a proposal for repair of the noncompliant concrete to the Engineer for consideration.
 - .2 Any additional testing requested by the Contractor shall be subject to approval of the Engineer.
 - .1 Additional testing shall be conducted at the Contractors own expense.
 - .3 If the remedial measures are accepted by the Owner and the noncompliant concrete is allowed to remain, the concrete in the placement shall be paid according to Table 302-5.
 - .2 If the noncompliant concrete is removed and replaced, the concrete incorporated into the placement shall be paid according to 302.6.5.
- .5 Additional tests of cylinders, cured entirely under field conditions, may be required to check the adequacy of curing or cold weather protection.
 - .1 Test cylinders shall be stored as near as possible to the point in the Structure that the test cylinders represent, and shall be afforded the same temperature protection and moisture environment as the Structure.
 - .2 At the end of the curing period the test cylinders shall be left in place, exposed to the weather in the same manner as the Structure.

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- 302.4.12.7.5 .3 All test cylinders shall be removed from the field storage and stored in lime water at $23 \pm 2^{\circ}\text{C}$ for $24 \pm 8\text{h}$ immediately before time of testing to ensure uniform moisture conditions from cylinder to cylinder.

The following payment articles were revised to correspond to other changes in the Item, or Division:

- 302.5 .2 For beam supported concrete deck slabs the computed volume of concrete in Structures "D" shall include the concrete calculated based on the actual beam camber profile.
- .3 On partial depth concrete removal and replacement under Item 372, the volume shall be the actual quantity of concrete placed.
- .4 For footing and working slab concrete where Overexcavation in solid rock occurs payment shall be handled as follows:
- .1 For Overexcavation down to a maximum of 150 mm below the specified elevation of the bottom of the footing the computed volume of the footing concrete shall be determined from design plan footing dimensions presented in the Contract Documents and the average depth of the footing.
- .2 For Overexcavation in excess of 150 mm below the specified elevation of the bottom of the footing, the width and length of the working slab concrete will be as shown on Standard Drawing 302-3, and the average depth of the working slab shall be determined from the bottom of the excavation up to the specified elevation of the bottom of the footing.
- .1 Concrete required to provide a working slab under footings shall be paid at the Contractor's invoice price from the supplier.
- .5 The specified volume of tremie concrete for which payment shall be made shall be the volume contained within cofferdams assuming the theoretical horizontal dimensions as shown in the Contract Documents and the base and upper surface elevations as measured in the field and in accordance with 302.4.5.1.2.
- .6 Measurement of concrete in Structures, calculated on the dimensions shown in the Contract Documents, shall not be affected by the formwork tolerances listed in Item 958.
- .7 The Price Adjustment for Control of Strength shall be paid in accordance with Table 302-5.

**Table 302-5
Price adjustment for Control of Strength**

| For Concrete in Structures A, B , C and D | | | | |
|--|---------|-----------|-----------|---|
| Strength | 50 MPa+ | 45-49 MPa | 40-44 MPa | Less than 40MPa- To be reviewed by Engineer |
| Payment per cubic metre component | 100% | 95% | 90% | Removal or 75% (per 302.4.12.7.4) |

- 302.5 .8 The price adjustment for Resistance to Chloride Ion Penetration shall be paid in accordance with Table 302- 6.

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**Table 302-6
Price Adjustment for Resistance to Chloride Ion Penetration**

| For Exposure Class C-XL in CSA A23.1 | | | | | |
|--|-------|----------|-----------|-----------|-----------|
| Coulombs (ASTM C1202) | 0-500 | 500-1000 | 1000-1300 | 1300-1500 | 1500-2500 |
| Payment per cubic metre for component (% of Unit Price) | 110% | 105% | 100% | 95% | 75% |

The following Basis of Payment articles were added to correspond to changes:

- 302.6 .4 The Contractor shall be subjected to a penalty of \$1,000.00 per occurrence, if proper wet curing is not carried out. For the purposes of this Item, an occurrence shall be when an inspection reveals that wet curing of concrete is not being carried out in accordance with 302.4.8.3.1.1.
 - .1 This shall apply to each placement which is still being cured.
- .5 Where noncompliant concrete is removed and replaced in accordance with 302.4.12.7.4.2, the concrete incorporated into the component shall be paid at 100% of the Unit Price.

304- REINFORCING STEEL

The following Item has had all articles pertaining to epoxy coated reinforcing steel deleted because it is no longer used:

- 304.2.3.1 & 304.2.3.2 *revised articles to require W Grade reinforcing steel, as there are more stringent bending tests carried out on the steel.*
- 304.2.8 *added article to address disputes encountered during construction: Bar splice couplers shall be supplied in accordance with the Contract Plans.*
- 304.3.2.1 *revised article as follows to reference current governing standard: All welders shall be certified by the CWB in accordance with CAN/CSA W47.1 W186 specifications, and/or to a certification level of Qualified Welder as issued by the Province of New Brunswick.*
- 304.4.1.2 *added article as follows: The Work shall be in accordance with CSA A23.1, and Concrete Reinforcing Steel Institute (CRSI), Placing Reinforcing Steel Recommended Practices.*

The following articles were rewritten to address the various construction issues with improperly placed, spaced, and supported reinforcing steel:

- 304.4 .2 **Placing and Fastening**
 - .1 Immediately before placing, reinforcing steel shall be free of oil, dirt, mill scale, loose or excessive rust or other coatings that would reduce bond to concrete.
 - .1 Reinforcing steel shall be maintained in this clean condition until embedded in concrete and reinforcing steel about to be embedded in concrete shall be free of loose hardened concrete.
 - .2 Bar supports shall be made of plastic or stainless steel.

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- 304.4.2 .2 Reinforcement shall be accurately positioned, secured, and supported, using bar supports and side form spacers, to ensure proper concrete cover and spacing within allowable tolerances before and during placement of concrete.
- .3 Bars shall be fastened together at all intersections, except where the spacing is less than 300 mm in each direction, in which case fastening at alternate intersections of each bar with other bars will be permitted, provided the Contractor can demonstrate to the Engineer that this will hold all the bars securely in position.
- .4 In deck slabs, the top bar on the top mat shall be tied securely to the stirrups of the precast prestressed concrete beam or the connectors on the steel beam.
- .1 Spacing of the ties shall not exceed 900 mm centre along the entire length of the beams.
- .5 The Contractor shall ensure flexing of the reinforcing steel partially embedded in the Work shall not occur until the concrete has attained a minimum compressive strength of 20 MPa..
- .6 Work on partially embedded reinforcing steel shall continue only when the previously placed concrete has attained a minimum compressive strength of 20 MPa.
- .7 Prior to the deposition of concrete the positioning and securing of the reinforcing steel will be inspected and approved by the Engineer.

304.4 .3 Support of Reinforcement

.1 Bar Supports

- .1 Bar supports shall have sufficient strength and stiffness to carry the loads from the reinforcement, construction crew and concrete pressures without failure, displacement or significant deformation.
- .2 Bar supports shall be spaced such that any sagging between supports shall not reduce the specified concrete cover.
- .3 Bar supports shall be made of plastic.
- .1 Commercially available precast concrete bar supports, or Engineer approved equivalent, shall be used for bar supports that are in contact with soil.
- .1 Precast concrete bar supports shall be made of concrete with a quality at least equal to that specified for the member into which the bar supports are integrated.
- .1 Geometry of bar support or embedded tie wires shall keep rebar securely fastened.
- .2 Stacking of bar supports shall not be permitted.
- .4 Bar supports shall be nonconductive and have a geometry and bond characteristics that deter the movement of moisture from the surface to the reinforcement,
- .5 Bar supports in contact with the soil shall have a base area of less than 10,000 mm².

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304.4.3 .2 Side Form Spacers

- .1 Side form spacers shall have provisions to enable them to be firmly secured to the reinforcement.
- .2 Side form spacers shall meet the requirements of 304.4.3.1, Bar Supports.

.3 Internal Spacers

- .1 Spacers for maintaining the specified distance between layers of reinforcement shall be made from reinforcing bars or steel rods.
 - .1 Spacers shall be positioned and securely fixed between the layers of reinforcement and shall not protrude in the cover concrete.

Table 304-1 Reinforcing Steel Tolerances: *In order to clarify the intent of the table the following revisions were made to the Table:*

- **In "Fabrication Tolerances" for "Hooked bars" for "bars larger than 25M" the tolerance was changed to +10mm/ -40mm.**
- **In "Placing Tolerances" the bottom cell " **except where specified concrete cover at ends of members shall no be reduced**" was deleted, and the following Note added:** Cover may not be reduced by more than 10mm of increased by more than 20mm at the end of a member.

305- TENSION SPLICES

The following articles were revised to more accurately reflect the submittal requirement:

305.3 SUBMITTALS

- .1 The Contractor shall submit the name of the supplier and the manufacturer/supplier's technical data information, including yield stress, recommended installation procedures at least 14 Days in advance of the Work.
- .2 ~~When requested,~~ The Contractor shall submit the manufacturer's instructions and recommended procedures for installation. ~~and instructions.~~

311- STEEL H PILES

Articles were revised as follows due to the electrodes formerly specified being discontinued:

- 311.2 .6 Electrodes for the Shielded Metal Arc Welding (SMAW) process shall be certified to ~~CAN/CSA W48.1 and shall be basic (low hydrogen) electrodes E48016 or E48018~~ by the Canadian Welding Bureau (CWB), conform to CSA W48, "Filler Metals and allied materials for metal arc welding", and be classified as E4918 or E4918-1.
- .7 Electrodes for the Flux Cored Arc Welding (FCAW) process shall be certified to ~~CSA W48.5-E4801T-X-CH with a minimum~~ by the Canadian Welding Bureau (CWB), conform to CSA W48, and be classified as gas shielded, E49XT-XX or E49C-XX with a specified minimum Charpy V-Notch Impact Property equal to 27 Joules at -30 °C.
 - .1 Electrodes shall have a diffusible hydrogen designator of -H16 or less.

312- STEEL PIPE PILES

The same changes to Item 311 above were made to 312.2.5, 312.2.6, & 312.2.6.1.

312.4.8.1.1 *The following article was added: Piles to be tested shall be driven with an external hammer.*

331- PRECAST PRESTRESSED CONCRETE BEAMS

The materials section (331.2) now refers to CSA exposure class C-XL which rendered much of the section redundant. The redundancies have been deleted, and the section rearranged for consistency with other items, as well as clarity. The Materials section shall now read as follows:

331.2 MATERIALS

.1 General

- .1 All materials and procedures shall be supplied by the Contractor.
- .2 Material properties shall conform to CSA A23.1, if not otherwise specified herein.

331.2 .2 Material Properties

331.2.2 .1 Aggregates

- .1 Aggregates used in concrete shall meet the material properties specified in accordance with 302.2.

331.2.2 .2 Admixtures

- .1 A written statement shall be provided to the Engineer from the manufacturer stating that the admixture contains no purposely added calcium chloride.
- .2 The calcium nitrite corrosion inhibiting admixture shall contain between 30% to 36% calcium nitrite by weight of solution.

331.2.2 .3 Water

- .1 Water used in production and curing shall be clean and free from any materials which shall cause discoloration or harmful effects to the concrete.

331.2.2 .4 Composition of Mix

- .1 Concrete shall meet the requirements of CSA A23.1, exposure class C-XL
- .2 Concrete shall have a slump not greater than 210 mm.
- .3 No materials shall be used in the mix design that contain purposefully added chloride compounds in any quantity.

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- 331.2.2.4 .4 A calcium nitrite corrosion inhibitor shall be added to the concrete at a dosage rate of 15 L/m³.
- .1 The calcium nitrite shall be added at the concrete ready mix plant and verification shall be provided to the Engineer for the Quantity of the calcium nitrite added, to each batch of concrete.
 - .1 Acceptable verification shall include, but is not necessarily limited to, printouts from computerized batch plants or printouts from computerized admixture dispensing units.

331.2.2 .5 Stranded Wire

- .1 Prestressing strands shall be of the 7 wire stress-relieved stabilized type and shall meet the requirements of ASTM A416M and have an ultimate tensile strength of 1860 MPa unless otherwise specified in the Contract Documents.
 - .1 Wire welds, breaks, nicks, bends or any other defect shall not be permitted in any prestressing cable.
 - .2 All prestressing steel must be free of deleterious materials such as oil, grease, frost, paint, mill scale, loose rust, corrosion and any foreign material, which may prevent bond between steel and concrete.
 - .3 In pretensioning strands one approved splice per strand shall be permitted, provided the splice is not located within the concrete member. Welded strand joints or wire splices shall not be permitted in any reel or coil of strand.
- .2 All stranded wire shall be delivered in coils with a metal tag attached to each coil showing:
 - .1 The manufacturer's name;
 - .2 The heat number;
 - .3 The coil number; and
 - .4 Each coil shall be accompanied by a stress-strain curve, showing:
 - .1 the corresponding information of the metal tag,
 - .2 ultimate strength,
 - .3 the date of manufacture, and
 - .4 the stress-strain curve from zero stress to ultimate.
- .3 The shipping package or form shall be clearly marked with a statement that the package contains high-strength prestressing steel, and the care to be used in handling.

331.2.2 .6 Reinforcing Steel

- .1 Reinforcing steel shall be supplied in accordance with 304.2.
- .2 Welding of reinforcing steel, including tack welding, is prohibited without the written permission of the Engineer.

331.2.2 .7 Inserts

- .1 Inserts shall be of sufficient capacity and of an approved type as specified and shall be placed in the location(s) as indicated by location in the Contract Documents.

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The following articles were revised, as follows, to refer to proper standards:

- 331.4.1 .1 The Contractor shall carry out the Work as indicated in the Contract Documents and/or as specifically directed by the Engineer and in accordance with ~~CAN/CSA A23.4~~.
- .2 The Contractor shall provide certified copies of quality control tests related to this Contract as specified in ~~CAN/CSA A23.4~~, and ASTM A416M, ~~CAN/CSA A251 and CAN/CSA G279~~.
- .3 The Contractor shall inspect prestressed concrete tendons in accordance with ~~CAN/CSA G279~~ Canadian Prestressed Concrete Institute (CPCI).
- .6 Precast plants shall keep complete records of supply source of concrete material, steel reinforcement, prestressing steel and shall provide this information to the Engineer, ~~upon request~~.
- 331.4.1.11 *added article to ensure proper inspection and address the problem of very short notice fabrication schedule changes:* The Contractor shall provide 7 Days written notice prior to commencement of any fabrication or change in fabrication schedule.
- 331.4.4.1.5.1 *deleted article, as small cylinders are now commonly used within CSA:* Cylinders having a nominal dimension of 100 mm by 200 mm may be used to determine the 28-day compressive strength provided that a correction factor of 0.95 is employed.
- 331.4 .6 *All references to "De-tensioning" in the subsection and title have been changed to " Stress Transfer" for consistency and proper nomenclature.*
- 331.4 .9 Handling, Storage and Shipping

Articles 331.4.9.1 - 331.4.9.8 have been placed in 331.4.9.1 "General" subsection, and the following articles were moved from 331.2, or added to clarify proper lifting practices:

331.4.9.2 Lifting Devices

- .1 Lifting devices shall be supplied in the beam as indicated in Standard Drawing 331-1 and/or as specified in the Contract Documents, and;
 - .1 Beams having a mass of more than 23 tonnes and less than 43 tonnes shall have a steel plate, as indicated on the Standard Drawing 331-1, typical for the DOT type I- and AASHTO type IV-Beams.
 - .2 Beams having a mass of more than 43 tonnes and less than 60 tonnes shall have a steel plate, as indicated on the Standard Drawing 331-1, typical for the Bulb-Tee type Beams.
 - .3 Lifting devices for beams having a mass of more than 60 tonnes must be approved by the Engineer and shall be submitted for approval as part of 331.3.1.
 - .4 Beams shall be stored on blocks at least 150 mm off solid level ground and adequately braced and secured to prevent overturning.

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335- STEEL SUPERSTRUCTURE

The following articles were revised be in accordance with other revised Items, to ensure qualifications are demonstrated and verified prior to award of contract:

335.3 .1 Qualifications of Fabricator

- .1 Within 12 Days after Tender Closing and prior to Award of the Contract, the Contractor shall submit the following:
 - .1 Documentation from the Canadian Institute of Steel Construction indicating the steel fabricator is a member in good standing of the Canadian Institute of Steel Construction.
 - .2 Documentation from the Canadian Welding Bureau indicating the fabrication shop is fully certified to the requirements of CAN/CSA W47.1, Division 1

342- BRIDGE POT BEARINGS

342.4.1.2.3.2 *revised article as follows:* For bearings with a capacity over 5000 kN at serviceability limit state Type II plus 5% of the vertical load in excess of 5000 kN.

351- WATERPROOFING

351.4.7.2 *revised article as follows:* The membrane shall be installed in accordance with Standard Drawing 351-3, cover the entire top surface of the Culvert and the upper 450 mm of the sides.

366- FREE-DRAINING BACKFILL

366.2.3.1 *revised article to correspond to 302 revisions:* Concrete aggregates meeting the ~~specified limits in Table 302-2~~ requirements of Item 302.2 may be approved for supply under this Item.

372- REMOVAL OF DECK CONCRETE

Item 372 was improperly named, as it was the item used for any concrete removal, which the title now reflects. The following additions were made to the Equipment subsection of construction to address issues of inappropriate equipment being used to remove concrete.

372.4 .2 Equipment

- .1 All Equipment used to remove concrete from the repair areas shall be subject to the approval of the Engineer.

372.4.2 .2 Chipping hammers

- .1 Chipping hammers shall weigh less than less than 15 kg.
- .2 Chipping hammers shall be permitted in all areas of concrete removal.

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372.4.2 .3 Jackhammers

- .1 Jackhammers shall weigh less than 40 kg.
- .2 Concrete removal utilizing a jackhammer shall not be permitted in the following areas:
 - .1 Within 100 mm of concrete that is to remain in place;
 - .2 Within 100 mm of the edges and faces of structural steel members that are to remain in place; and
 - .3 Within 25 mm of reinforcing steel that is to remain in place.

372.4.2 .4 Rig-Mounted Breakers

- .1 Utilizing a rig-mounted breaker for concrete removal shall not be permitted in the following areas:
 - .1 For barrier walls, parapet walls and deck slabs supported by concrete girders, unless the girders are to be removed;
 - .2 For barrier walls and parapet walls supported by steel beams, unless the deck slab is to be removed;
 - .3 Within deck joint assembly;
 - .4 Located within a distance from concrete to remain in place equal to the sum of 600mm and the lap length of steel reinforcement to remain in place as specified in the Contract Documents; and
 - .5 Within 600 mm from the edge and faces of structural steel members including shear studs to remain in place.

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MUNICIPAL

DIVISION 400

DIVISION 400- MUNICIPAL

416- CURB AND GUTTER & 419- CONCRETE SIDEWALK

416.2.2 *revised articles as follows to refer to the proper standard:* Concrete shall be supplied in
& 419.2.2 accordance with 301.2, ~~class of~~ and CSA A23.1 exposure class C-2.

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TRAFFIC CONTROL DEVICES

DIVISION 600

DIVISION 500 - TRAFFIC CONTROL DEVICES

The following article was added to ensure that qualified individuals are doing the electrical work for quality and safety reasons: An electrical contractor holding a valid electrical contractor's license issued by the Province of New Brunswick shall perform all electrical Work.

Following articles numbers are where this addition can be found: 531.4.2.1, 532.4.2.1, 533.4.2.1, 540.4.2.1, 542.4.2.1, 543.4.2.2, 544.4.2.1, and 545.4.2.2.

510- GUIDE POSTS

The following articles were added to address a construction issue encountered with the use of salvaged rail:

510.2.10 Offset blocks shall conform to 510.2 and shall be sized in accordance with the details indicated on Standard Drawing 510-1.

510.2.10.1 Salvaged rail may require the length of the offset block to be greater than the 342 mm shown in the Standard Drawing 510-1 in order to achieve the minimum 15.5 mm above and below the rail.

512- GUIDE RAIL

512.2.5 *article was relocated to 510.2.10 because offset blocks are part of the Guide Post Item:* Offset blocks shall conform with 510.2 and shall be sized in accordance with the details indicated on Standard Drawing 510-1.

512.4 .4.1 *added article to clarify time requirement:* The Contractor shall allow for a two week turn around for straightened rail.

534- REMOVAL OF POWER POINT

The following articles were added to ensure that qualified individuals are doing the electrical work for quality and safety reasons:

534.4.2.1 An electrical contractor holding a valid electrical contractor's licence issued by the Province of New Brunswick shall perform all electrical Work.

534.4.2.2 All electrical equipment shall be removed in accordance with New Brunswick Regulation 84-165 of the Electrical installation and Inspection Act for the Province of New Brunswick.

540- SIGN OR LIGHT BASE

The following articles were revised/added to refer to CSA standards:

540.2 .3 Concrete shall be designed, produced, supplied and placed in accordance with 301.2, 301.3, and 301.4. ~~supplied in accordance with 301.2, class of exposure F-1.~~

.1 Concrete shall meet the requirements of CSA A23.1 exposure class C-1.

The following articles were added to address problems with workmanship on site:

540.4.8.1.1 Areas in excess of the 3 mm permissible tolerance may be removed by abrasive means, provided the minimum cover requirements specified in the Contract Documents are met.

540.4.8.1.2 If the concrete surface, upon removing areas in excess of the 3 mm permissible tolerance, is not to the Engineer's satisfaction, the Contractor shall, as directed by the Engineer, entirely remove certain designated portions, or all of the concrete, and replace the new concrete.

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TRAFFIC CONTROL DEVICES

DIVISION 600

540.4.9 The Contractor shall restore the Work Area to its original condition. This may include shaping, topsoiling, and hydroseeding to the satisfaction of the Engineer.

542- LIGHT STANDARD

542.1.1 & 542.5.1 *The articles were revised as follows to better identify what is included in the Item:*
"installation and/or reinstallation"

542.2.1 *"Frangible bases" was added to the list of materials available from the DOT, Fredericton.*

552- ROADSIDE SIGN

552.1.1 & 552.5.1 *The articles were revised as follows to better identify what is included in the Item:*
" installation and/or reinstallation "

The following articles were revised to address construction issues and render the specification more enforceable:

552.4 .2 The Work shall be carried out in such a manner so as to avoid damage to the roadside sign, post and the adjacent and surrounding Roadway.

.1 The Contractor shall be responsible for any damage to, or loss of materials, from the time he takes possession of these materials until such time as they have been accepted in the Work.

.2 The repair of any damage resulting from this Work shall be carried out by the Contractor at his/her own expense.

554- OVERHEAD SIGN STRUCTURE FOUNDATION

The following revisions were made to the Item to clarify the required construction practices and new submittal requirements:

554.1 *Description of the Item now includes "excavation, [&] shoring,"*

554.2.2 *revised article as follows: Concrete shall be designed, produced and supplied in accordance with CSA A23.1-04, and the concrete shall meet the requirements of Table 2, Exposure Class C-XL, supplied in accordance with 301.2, class of exposure C-2.*

554.3.2 *Revised article to require submittals" in accordance with 302.3 and 302.4,"*

Articles 554.3.2.1, 554.3.2.1.1, 554.3.2.1.2, 554.3.2.2, 554.3.2.2.1, 554.3.3, and 554.3.4, were also added to further clarify require submittals for shoring, and for Concrete, including Plant certification, Mix design, aggregate sources.

The following articles were added/revised to ensure proper construction practices:

554.4.1.1 Concrete construction methods shall be in accordance with CSA A23.1.

554.4.3.1 Shoring shall be installed in accordance with 361.4

554.4.5 Concrete construction methods shall be in accordance with 302.4. ~~Formwork and concrete placement and curing shall be in accordance with 301.4.~~

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TRAFFIC CONTROL DEVICES

DIVISION 600

- 554.4.6 Anchor bolts shall be installed to conform with the requirements noted on the Plan and Item 555. ~~Standard Drawings 554-1, 554-2 and Item 555.~~
- 554.4.12 *added article to include restoration of site in Item:* The Contractor shall restore the Work Area to its original condition. This may include shaping, topsoiling, seeding and/or mulching to the satisfaction of the Engineer.

555- OVERHEAD SIGN STRUCTURE

The entire Item was reviewed as *materials for overhead sign structures are now owner supplied, Instead of Contractor supplied and as a result, much of the Item was deleted. The following points will outline some of the major changes, however, please see the full Item for details.*

- Materials are owner supplied and available from stock at DOT Fredericton (555.2.1).
- Contractor must submit an erection procedure stamped by a NB Professional Engineer, at least 14 days before erection (555.3.1).
- The Contractor must notify the Engineer, 14 days in advance of the erection of the overhead sign Structure(555.4.4.6).

571- PAVEMENT MARKINGS

New Item incorporated in 2011 edition.

576- CONSTRUCTION TRAFFIC CONTROL

New Item incorporated in 2011 edition.

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ENVIRONMENTAL

DIVISION 600

DIVISION 600- ENVIRONMENTAL

602- SEDIMENT CONTROL FENCE

602.4.2 *added article in order to allow for fast and proactive environmental mitigation and to correspond to changes to Item 948:* The Contractor shall install additional sediment control fence as directed by the Contractor's on-site environmental representative, as defined in 948.2, when necessary to comply with Item 948, as well as applicable permits and regulations.

602.4.2 .2 *Article was deleted in order to avoid conflict with additions.*

605- EROSION CONTROL STRUCTURE

605.4.2 *added article in order to allow for fast and proactive environmental mitigation and to correspond to changes to Item 948:* The Contractor shall install additional erosion control structures as directed by the Contractor's on-site environmental representative, as defined in 948.2 when necessary to comply with Item 948, as well as applicable permits and regulations.

605.4.3 .1 *Article was deleted in order to avoid conflict with additions.*

There were many environmental issues encountered due to lack of maintenance to erosion control structures. There were often issues getting the structures cleaned out as there was no measure for payment. The following revisions were made to the Item to address these issues:

605.4.6 The application, construction details and clean-out requirements for the different types of erosion control structures shall be carried out as indicated in Table 605-1 and 605.4.7.

Table 605-1 "Erosion Control Structures" Title "Maintenance" has been replaced with "Clean-Out Requirements".

605.4 .7 Clean-out consists of removal of sediment deposits retained by the structure and disposal of the removed materials in accordance with 605.4.11

.1 Sediment removal shall be performed so as to cause minimal disturbance to the ground or any part of the erosion control structure, and in the case of Type A structures, to the sediment pond dyke.

.8 The Contractor shall maintain erosion control structure(s) in a functional condition from the time of installation until their removal.

.1 All erosion control structures shall be kept in place until the grass on hydroseeded slopes and ditches is established as an effective erosion deterrent, or as directed by the Engineer.

.1 In Work Areas that are hydroseeded up to but no later than September 15th, erosion control structures Types B,C, and D shall be kept in place until the day on which the ground is prepared for hydroseeding, as approval by the Engineer.

.2 All erosion control structures(s) shall be removed under Item 606.

605.5.2 The Quantity to be measured for payment for clean-out of retained sediment deposits will be the number of such clean-outs performed in accordance with 605.4.6 as approved by the Engineer.

605.6.2 Payment for Work under this Item shall include a separate Unit Price for the clean-out of each type of erosion control structure, as identified under the Contract.

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ENVIRONMENTAL

DIVISION 600

613- TOPSOIL

613.4.4.3 *Article was added to clarify where topsoil is to be placed: Topsoil shall be placed on Foreslopes from Subgrade shoulder down in cuts and fills, including the slopes of the layer of Borrow A/A1-quality material; and on Backslopes, or as directed by the Engineer.*

614- HYDROSEEDING

In the field, Hydroseed A was being found to be ineffective, while Hydroseed C was a pilot effort that is no longer called, thus Hydroseed B shall be used for all contracts. All references to Hydroseed A and C in the Item have been removed.

The following revisions were made to the Item as follows to specify processed straw mulch in municipal mix:

614.2 .9 Only processed straw mulch shall be used for Hydroseeding BM.

.1 Processed form of straw mulch being shredded straw.

**Table 614-3
Application Rates for Hydroseed**

| Type of Material | "B" (kg/ha) | "BM" (kg/ha) |
|---|----------------|----------------------|
| Seed | 125 | 200 |
| Fertilizer | 375 | 375 |
| Hydraulic Mulch: All | 500 | 500 |
| Binder (tackifer) | See Note | See Note |
| Mulch: Hay/straw bales/rolls | Per 616.4 | Straw only per 616.4 |
| NOTE: Application rate per manufacturer's specifications. | | |

616- MULCHING

Hydraulic mulch is no longer approved for use under this Item. *Articles 616.2.2.2, 616.4.1.1, 616.4.4, and 616.4.4.1 were deleted to remove reference to hydraulic mulch, and correspond to other changes.*

616.4.2 *added article in order to allow for fast and proactive environmental mitigation and to correspond to changes to Item 948: The Contractor shall apply additional mulch as directed by the Contractor's on-site environmental representative, as defined in 948.2, when necessary to comply with Item 948, as well as applicable permits and regulations.*

616.4.7 *article revised to correspond to Item 116 changes: Ditches carried out in accordance with 116.4, and areas requiring the hand placement of mulch may, subject to the approval of the Engineer, be placed without binder*

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ENVIRONMENTAL

DIVISION 600

618- TREES AND SHRUBS

618.6.1 *Article revised to correct requirements for separate unit price payment for different types of trees and shrubs: Payment for Work under this Item shall ~~be at the~~ include a separate Unit Price for each type of tree or shrub, as identified under the Contract.*

620- TEMPORARY WATER BARRIER

620.4.4 *Article revised to require documentation of inspection as requested by DOE: The Contractor shall inspect and document the temporary water barrier after each rainfall and at least daily during periods of prolonged rainfall.*

621- TEMPORARY WATER CONTROL WORKS

There have been many issues with failure of temporary water control works, and thus the specification has been revised many times over the past few years to address failures. These revisions were made via PS, as this Item was called frequently during the Pipe Rehabilitation Program. The changes from the PS were reviewed for inclusion and the Item was revised completely to render it more stringent, while remaining applicable to contracts other than Pipe Rehabilitations. The following points will outline some of the major changes, however, please see the full Item for details

- Temporary Water Control Works are called TWCW
- Item includes supply, installation and maintenance of sediment control fence required as part of the work (621.2.2 & 621.4.7).
- Must submit two NB Professional Engineer stamped design drawings and calculations for TWCW for 1:10 year flow a minimum of 14 days before commencing the Work.(621.3).
- \$1,000/day penalty will apply when TWCW fail, however will not apply if " Contractor submits documentation (such as actual flow [m³/s] measurements) that verifies that flows exceeded the design capacity of the TWCW" (621.4.6.2 & 621.6.2)
- Payment at Lump Sum Price.

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PAYMENTS & ADJUSTMENTS

DIVISION 800

DIVISION 800- PAYMENTS & ADJUSTMENTS

HAULAGE: 801 & 802

Table 801-1 & 802-1 "Haulage Rates" were deleted in the Items, as the rates are variable. Instead, the website with current haulage rates is referred to, as follows:

801.1 DESCRIPTION

- .1 Haulage rates for the haulage of specified soil, rock and aggregate materials shall be as identified in Table 801-1 on a tonne-kilometre basis.

- .1 Current haulage rates, including Table 801-1, available from the following web address:
<http://www.gnb.ca/0113/haulage/haulage-rates-current-year-e.asp>

OVERHAUL: 806, 807, & 808

Table 806-1, 807-1 & 808-1 "Overhaul Rates" were deleted in the Items, as the rates are variable. Instead, the website with current overhaul rates is referred to, as follows:

806.1 DESCRIPTION

- .1 Overhaul rates, when required under an Item, shall be paid to the Contractor by the Owner as set out in Table 806-1 ~~herein~~.

- .1 Current overhaul rates, including Table 806-1, available from the following web address:
<http://www.gnb.ca/0113/haulage/haulage-rates-current-year-e.asp>

810- FIXED RATES

Table 810-1 "Fixed Rates" under" for Item 260", the fixed price for "Anti-stripping Admixtures - based on total admixture addition per tonne of Actual Asphalt Cement "changed from \$15.00 per "tonne of Actual Asphalt Binder" to \$25.00.

812- EXTRA WORK

The following article was revised to address Standby time, however will soon be replaced by PS reverting it back to the article seen in the 2006 edition.

- 812.3.7 .4 If delays occur that are directly attributable to the Extra Work, standby time shall be paid at half the applicable rental rate for the Equipment carrying out the Extra Work.

821- ADJUSTMENT FOR ASPHALT BINDER PRICE

New Item incorporated in 2011 edition, and formerly in Contract Documents as "Attachment A".

825- MOBILIZATION

New Item incorporated in 2011 edition.

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STANDARD CONDITIONS

DIVISION 900- STANDARD CONDITIONS

906- WORK SCHEDULE

The following revisions were made to the description to address changes to timing and requirements pertaining to work schedules, as well as the process of approval. These changes reflect the Particular Specifications (PS) in use since 2009 and current NBDOT practices:

- 906.1.2 The Initial Work Schedule shall be the Work schedule submitted within 30 Days of the formal notice of award of the Contract and not later than 4 Days prior to the first job meeting, for approval by the Engineer.
- 906.1 .3 The Initial Work Schedule shall be reviewed at the first job meeting:
- .1 If the schedule is satisfactory, the Engineer will indicate approval by signing it.
 - .2 If the schedule is not satisfactory, the Engineer will advise the Contractor of the reasons and identify the required modifications.
 - .1 If the identified modifications are made at the meeting, each modification will be initialed by both the Contractor and the Engineer and the Engineer shall approve the schedule by signing it.
 - .2 If the identified modifications are not made at the meeting, then within 3 Days following the meeting the Contractor shall submit a new Initial Work Schedule modified in accordance with the Engineer's comments.
 - .3 The Engineer will distribute copies of the approved schedule, which shall be the Initial Work Schedule for the purposes of 906.1.5 and GC 48(1).
 - .4 Pursuant to GC 48(2), no progress claims will be paid by the Owner during the time the Contractor is in default under 906.1.2 or 906.1.3.2.2

912- HIRING PRACTICES

- 912.1.2 *revised article to reflect the current regulation:* Regulation ~~90-149~~ 2007-34 of The Employment Standards Act for the Province of New Brunswick shall apply.

921- CONSTRUCTION ROADS

The following articles were revised/added to clarify the Contractor's responsibilities:

921.2 WORK AREA ACCESS ROADS

- .1 The Contractor shall be responsible for procuring access to and from the Work Site, and for acquiring permission from landowners to build access roads or to use existing woods roads or trails on private property.
 - .1 Vehicles and Equipment used during construction activities shall utilize only approved roadways and access areas.

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STANDARD CONDITIONS

921.4 ACCESS TO PUBLIC ROADS

921.4 .1 The Contractor shall make every effort to avoid tracking mud, snow, and debris onto public roads. Any such materials that are tracked onto a public road shall be scraped or swept off no later than sunset each day, and during the day if so needed, to the satisfaction of the Engineer.

931- SCALES AND WEIGHING PROCEDURES

Table 931-1 Approved Private Scale Companies, was updated as follows:

| | | |
|---|--|--|
| Advatek Systems Inc. | Moncton, NB | 506-857-0909 |
| *All Weigh Systems (2002) Inc. | Fredericton, NB | 800-563-9344 |
| Fleetway Inc. | Saint John, NB | 506-648-2226 |
| Mettler-Toledo Inc. | Canada | 800-663-5456 |
| Weigh-Tronix Canada | Atlantic Canada Fredericton, NB Quebec, QC | 800-565-7889 506-454-4010 888-496-9019 |
| NOTE: * identifies accredited Private Scale Companies that may perform initial inspection | | |

931.7 *The contact information for Measurement Canada was updated as follows:* Measurement Canada may be contacted as follows:

Measurement Canada Atlantic District
50 Brown Avenue
Dartmouth, NS
B3B 1X8
phone: 902-426-9982

932- PRIVATE TRUCKS

The following articles were added/revisioned to update to current Private Truck practices:

932.2 .2 "Company Trucks" means a truck legally owned or leased by the Contractor or Subcontractor and includes:

932.2 .3 "Private Truck" means a truck legally owned or leased by a "Local Resident", other than a lease arrangement within the definition of "Company Truck".

.1 In the case that the "Private Truck" is registered with a trucker's agent that requires direct payment, the payments shall be made to the trucker's agent.

936- COMPACTION

936.2.7.3 *added article to identify the percentage that should be attained during compaction, when test strips are used to determine control density and number of passes:* Lifts shall be compacted to a minimum of 97% of the control density.

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941- LINES AND GRADES

Revised articles to correct cross-referencing error and clarify intent:

- 941.6.4.2 Should the requirements ~~results~~ of 941.6.4.1 ~~941.5.4.1~~ ~~be outside the tolerances specified, then not be met,~~ the Contractor shall repair the Work to meet the specified tolerances and shall conduct a new stringline survey of the Work as per 941.6 ~~941.5~~, at his/her own expense.
- 941.6 .8 ~~Transverse~~ ~~The location of the checking transversely~~ shall be performed from the centreline point toward the Shoulder at the same location point (station) ~~as defined in 941.6.6 941.5.6 and based on the specified material type and reference distance specified in Table 941-1.~~

946- WORK PROGRESSION

- 946.3.4 *revised article, as follows, in order to clarify intent:* Stabilization is not required on the top surface of a fill, on the floor of a cut, or on the part of a cut the Contractor indicates shall anticipated to be excavated within one week after the 30th day.

947- DISPOSAL AREA

The cross-references were verified and corrected, and the following section added in order to address licensing of disposal areas:

947.2 LICENCE OF OCCUPATION

- .1 For waste disposal areas on Crown Land the Contractor shall apply to the NB Department of Natural Resources (DNR) for a Licence of Occupation.
- .2 The licence will be issued for all Crown Land adjacent to the Work Site. DNR district staff will be responsible for approving the locations of individual waste disposal sites on the Crown Land.
- .3 Inquiries should be made to the Crown Lands Branch at (506) 453-2437.

948- ENVIRONMENTAL REQUIREMENTS

The entire Item was reviewed as environmental mitigation and considerations are growing more and more important. The regulators are becoming more stringent, and thus so is the specification. The focus of these changes is to monitor and maintain mitigation that is in place, and take proactive action to ensure that the mitigation is sufficient. The following points will outline some of the major changes, however, please see the full Item for details.

- As conditions change quickly depending on the weather and progress of work, environmental mitigations must be continually monitored. Because of this requirement, the Item has been revised to include a Contractor designated on-site environmental representative who has completed Environmental Management Manual (EMM) training, and has the ability to address environmental issues, acquire staff, and procure materials when there is the potential for water and runoff issues, including holidays and weekends. (948.2)
- The Contractor's on-site environmental representative will be responsible for monitoring weather forecasts and mitigations. In order to allow for more **proactive action to avoid sedimentation of water and erosion**, articles 602.4.2, 605.4.2, and 616.4.2, have been added to allow the Contractor's on-site environmental representatives to direct his/her staff to install additional mitigation without waiting for approval of Engineer in order to comply to applicable regulations, and Item 948.

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- References to pay items (605, 614, 616 etc.) were removed where possible in favour of more general wording such as "the applicable Items in the Contract Documents". The 900 Division should not refer to payment, according to the guidelines of the Standard Specification Manual. Payment is still required for environmental mitigation, under the appropriate Item.
- Particular Specifications pertaining to Environmental Requirements were reviewed for inclusion, and general articles and subsections (Fuel Storage and Handling, Ancillary Facilities etc.) were included, while case or site specific subsections were left in the PS, (Environmental Management Plan (EMP), Environmental Training, HADD Authorization, etc.).

953- AUDITED SAFETY PROGRAM

New Item incorporated in 2011 edition.

956- CONSTRUCTION DRAWINGS AND CALCULATIONS

The following list was revised to include required submissions from revised Items:

- 956.1 .1 The Contractor shall supply the Engineer with drawings and design calculations for items including, but not limited to, the following:
- .12 Shop Drawings for Culverts per 130.3, 131.3, and 140.3; ~~441.3, and 142.3~~
 - .13 Overhead sign structures.
 - .14 Large Concrete Pipes; and
 - .15 Precast Concrete Box Culverts

958- FORMWORK

The following articles were added to address reoccurring construction issues:

- 958.2 .12 Anchoring devices, cast-in-place or driven, shall be approved by the Engineer.
- .1 Specified cover over embedded metal anchors shall be maintained.
 - .2 Re-moveable anchoring devices shall be removed without causing damage to the adjacent/surrounding hardened or partially hardened concrete.
- 958.3.3 *Article deleted and remaining articles renumbered accordingly.*

The following subsections were added to Item:

958.4 CORROSION PREVENTION

- .1 Tie wires, form ties, bolts, hardware and other embedded metal items shall extend to within less than the specified cover minus 10 mm from the concrete surface.

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958.5 DECK FORMWORK HANGARS

- .1 Hangars for deck formwork shall be of a type which can be completely removed or removed a minimum of 50 mm below the surface. Galvanized hangers must be removed a minimum of 19 mm below the surface.
- .2 In the event that the contractor's formwork design does not provide the above indicated minimum cover over the Hangars, a concrete haunch extension may be utilized provided it extends continuously from one end of the span to the other. No payment will be made for the concrete require.
- .3 If hangar removal leaves a hole of 13 mm or less it may be cleaned and patched utilizing concrete mortar consistent with the parent concrete and containing latex.