

**SPECIAL PROVISIONS APPENDIX  
FOR AMENDMENTS TO THE 2012 STANDARD SPECIFICATIONS  
FOR HIGHWAY CONSTRUCTION  
Updated: July 18, 2013**

The Amendments to the 2012 Standard Specifications for Highway Construction are as follows:

**SECTION 101 – Quality Management**

**Issued Date: Sep 25th, 2012**

**101.07 Payment** – The Lump Sum Price bid for Quality Management shall be full compensation for all costs resulting from the Quality Management requirements set out in the Contract.

Payment will be made on a monthly basis prorated for the percentage of the total Work completed as determined by the Ministry Representative, subject to the Contractor being totally compliant with the requirements of this Section and with its own Quality Control Plan.

The Ministry Representative, in consultation with the Ministry construction manager following the issuance of a Ministry- issued NCR pursuant to SS 107.05.02 may deduct an amount from any monthly payment so computed, for any quality management work required but not satisfactorily undertaken during that month. The Ministry Representative may also reduce the total Lump Sum payable by the value of any quality management work required but not satisfactorily undertaken during the Term of the Contract. The foregoing determinations will be made in the sole discretion of the Ministry Representative.

Inspection or testing by the Ministry Representative will be at the Ministry's cost. However, re-inspection or re-testing by the Ministry for repaired or replaced Work items that originally did not meet contract requirements shall be at the Contractor's cost.

Work that is deemed unacceptable in accordance with SS 101.01 will not be eligible for payment from the applicable Item for that Work.

The Completion Certificate will not be issued if there are any unresolved Non-Conformance Reports.

**SECTION 145 – GENERAL REQUIREMENTS FOR HIGHWAY, BRIDGE AND MARINE CONSTRUCTION**

**Issued Date: Dec 20th, 2011**

**145.24 Alterations to Drawings and Plans** – It shall be understood that the Drawings and Plans represent the nature and general layout of the work to be executed and not necessarily the works exactly as they will be carried out. The Ministry Representative will, without invalidating the Contract, be at liberty to make reasonable alterations or to furnish any additional or amended Drawings which do not materially change the type of construction.

Payment for any such altered Work will be at the rates set forth in the Schedule 7 Approximate Quantities and Unit Prices.

## **SECTION 201 – ROADWAY AND DRAINAGE EXCAVATION**

**Issued Date: Dec 20th, 2011**

**201.33 Overbreak in Solid Rock** - Overbreak in solid rock excavation encountered in the contract is that portion of any such material which is excavated, displaced or loosened outside and beyond the slopes or grades as staked or re-established (with the exception of slides as described in Subsection 201.42).

Any overbreak that occurs due to the inherent character of any formation encountered, as determined by the Ministry Representative in consultation with the Qualified Professional will be classified as allowable overbreak as described in subsection 201.33.01.

All other overbreak, as so defined, shall be removed by the Contractor at the Contractor's expense, and shall be disposed of by the Contractor, in the same manner as provided for "Surplus Material", but at the Contractor's expense without any allowance for overhaul, except as hereinafter stated.

The Qualified Professional is defined as the Ministry's Geotechnical Engineer, Rockwork Engineer, or consultant engineer working for the Ministry whose discipline is in geotechnical engineering.

**201.33.02 Contractor's Negligence** – Overbreak resulting from fault or negligence of the Contractor shall be removed and disposed of, as directed by the Ministry Representative, at no cost to the Ministry.

Definition of negligence will be deemed to be lack of following the sequence of operations, lack of a blast design, lack of preblast survey, and lack of as-built blast design as described in 204.04.06, 204.04.07, and 204.04.08 and 204.04.09. Also, definition of negligence will be deemed to mean lack of cut-off holes on the back slope, excessive spacing of drill holes and overloading of same.

## **SECTION 202 – Granular Surfacing, Base and SUB-BASES**

**Issued Date: Dec 1, 2011**

### **Table 202-C Aggregate Gradations.**

Table 202-C was revised for both the Intermediate Graded base (IGB) and the Intermediate Graded Sub-base (IGSB) % Passing the 0.075mm Sieve to 0-5% rather than 0-15%. Also for the Open Graded Sub-base (OGSB) % Passing 50mm Sieve to 70-100% instead of 75-100%.

## **SECTION 204 – ROCK CUTS**

**Issued Date: Dec 20th, 2011**

**204.03.03 Blast Vibration Monitoring** – The Contractor shall provide a blast vibration monitor if required. The blast vibration monitoring shall be under the direction of the Vibration Specialist.

## **SECTION 205 – RIPRAP**

**Issued Date: April 11th, 2012**

### **Table 205-C RECOMMENDED TESTS FOR RIPRAP**

For property (Specific Gravity and Absorption); Test Designation is corrected to be ASTM D6473 instead of ASTM D6437 for both Specific gravity and Absorption.

## **SECTION 211 – PORTLAND CEMENT CONCRETE**

**Issued Date: September 25th, 2012**

**211.17.03 Class 3 Finish** - Class 3 Finish is to be produced on all formed surfaces exposed to view from close distances, such as the top and inside surfaces of curbs and parapets, and to any surface for which a Class 3 finish is specified. A Class 3 finish shall provide surfaces of uniform colour and texture when viewed from less than 15 m.

In order to produce a Class 3 finish, the formwork shall render a true smooth surface, free from fins and projections. New plywood or steel is necessary to produce the required finish. Re-use of plywood forms will be permitted only if in an "as new" condition. Repairs to the forms shall be with full panels of sheathing only.

All ties, bolts, nails and other metal specifically required for construction purposes shall be removed or cut back to a depth of 50 mm from the surfaces of the concrete and the resulting holes filled.

No dry ties shall be permitted; form tie rods shall remain embedded and terminate not less than 50 mm from the formed face of the concrete. Removable embedded fasteners on the ends of the rods shall be such as to leave holes of a regular shape for reaming and filling.

- patch installation projecting slightly from the surrounding concrete surface.
- after 24 hours, saturated and carefully finished to render the surfaces of the patch true to the surrounding concrete, but any grinding using a hand carborundum stone kept to a minimum.
- when a rubbed finish is required, the applied mortar shall be carefully worked into the surface area being finished and, using a hand carborundum stone manipulated in a circular motion, the entire surface rendered true and smooth with all excess mortar removed.

## **SECTION 211 – PORTLAND CONCRETE CEMENT**

**Issued Date: July 18th, 2013**

**211.18 Hot Weather Concreting.** The equation in our specifications used to predict the temperature of fresh concrete based on the temperatures and masses on its constituent ingredients has been updated. The coefficient in the numerator is changed from "22" to "0.22".  
(See attached SS211 (21 of 27)).

## **SECTION 412 – CONCRETE REINFORCEMENT**

**Issued Date: July 16th, 2012**

SS412.11.02 Epoxy-Coated Reinforcing Steel is amended.

SS412.11.05 Stainless Steel Reinforcing Bar is amended.

## **SECTION 415 – MANUFACTURE AND ERECTION OF PRECAST AND PRECAST PRESTRESSED CONCRETE MEMBERS**

**Issued Date: Dec 20th, 2011**

**415.02.03** Materials and construction shall conform to the current CSA A23.4 and the current PCI "Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.". Where there is a discrepancy between the requirements of these two standards, the more stringent shall apply. In cases where it may be unclear as to which standard is more stringent, the Ministry Representative in consultation with the Ministry Chief Bridge Engineer will have the final say.

## **SECTION 502 – ASPHALT PAVEMENT CONSTRUCTION (EPS)**

**Issued Date: Nov 1, 2011**

Table 502-H (Page 21 of 32) – Payment Adjustments for Material Application Rate at Actual Application Rate (Percent as specified rate) at  $\geq 94.0$  to  $< 96.0$ , the bottom lift or single lift payment adjustment \$ per tonne of material in the Lot (unless otherwise noted) is -\$2.00 not -\$12.00.

**Issued Date: Nov 1, 2011**

Table 502-H (Page 21 of 32) – Payment Adjustments for Material Application Rate at Actual Application Rate (Percent as specified rate) at  $\geq 104.0$  to  $< 105.0$ , the bottom lift or single lift payment adjustment \$ per tonne of material in the Lot (unless otherwise noted) is -\$1.00 not \$1.00.

## **NEW SECTION 505 - USE OF RECLAIMED ASPHALT PAVEMENT IN ASPHALT PAVEMENT CONSTRUCTION - Issued Date Dec 11, 2012**

## **SECTION 508 – GRADED AGGREGATE SEAL COAT (EPS)**

**Issued Date: Nov 29, 2012**

SP508.66 Partial Payment for Rejected Work – In the Ministry representative's sole discretion and without setting precedence, where any work is reject but the Ministry representative determines that it may be left in place, the Ministry representative may authorize partial payment to the Contractor as full compensation for any residual value the work may have. Notwithstanding the foregoing, the Ministry is under no obligation to make any payment for reject work.

## **SECTION 582 – CONCRETE CURB AND GUTTER AND STORM DRAINAGE**

**Issued Date: July 16, 2012**

SP582-03.08 Corrugated Steel Manhole Main Smaller than Riser is added, missed from the previous update.

## **SECTION 635 – ELECTRICAL AND SIGNING**

**Issued Date: Feb 23, 2012**

SP 635-1.1.27 (16-25M REINFORCING STEEL BARS) changed to (20M REINFORCING STEEL BARS ON BOTTOM) see amended drawing.

## **SECTION 941 – PRECAST REINFORCED CONCRETE BARRIERS**

**Issued Date: Nov 29, 2012**

SP941-02.01.04 PRECAST CONCRETE MEDIAN BARRIER 810mm – CMB-E DETAILS.

## **SECTION 952-K - CONTRACTOR SUPPLY ASPHALT AND PAVING MATERIALS FOR HIGHWAY USE**

**Issue Date: July 2, 2013**

Table 952-K Requirements for High Float Emulsified Asphalts amended to reflect that for HF-150P with regards to penetration and viscosity to refer to Drawing SP952-05. In addition HF-100P is also added to the table.

The Ministry Representative may increase or decrease the frequency of QA inspection and testing during the course of the Work, based in part on the actual effectiveness of the Contractor's QC Plan.

**101.04 Quality Audit** – The Ministry may have one or more auditors on the Project, supplementing the work of the Ministry QA staff. When utilized, the auditor(s) will report to the Ministry Representative and provide a systematic and independent assessment of whether or not the materials and Project activities and related results comply with the Contract, the Contractor's QC Plan, and the Ministry's QA Plan. These auditors may be Ministry employees but will be assigned from resources which have not otherwise been involved with the Work.

The objective of Quality Auditing is to have an independent opinion on both QC and QA activities and be proactive in avoiding or reducing quality related issues by requiring the process of conformance verification to be systematic.

The auditor(s) will be allowed unrestricted access to the Site and all activities therein, to all testing and documentation of the work done by the Ministry, Contractor and their agents and suppliers.

**101.05 Non-Conformance Reports (NCRs)** – The Contractor shall and the Ministry may review the Work to determine conformance with the contractual requirements.

Non-conformances found shall be dealt with as follows.

**101.05.01 Contractor's Internal NCR** – Should the Contractor's QC reporting indicate that the Work is not in conformance, the QC Manager shall issue an internal Non-Conformance Report (NCR) to the Contractor, with a copy to the Ministry, including a response time.

The Contractor shall then respond to the QC Manager, with a copy to the Ministry Representative, with respect to the NCR, within the specified time, with proposed resolutions and corrective actions. The Contractor and/or the QC Manager may consult with the Ministry Representative on the resolutions but is not required to do so.

Payment for a Quality Management will not be affected by internal NCRs, as long as the issue is diligently pursued and resolved.

Payment for the Work itself may be withheld until the NCR issue is resolved.

**101.05.02 Ministry-Issued NCR** – Should the Ministry's QA reporting indicate that the Work is not in conformance, the Ministry Representative will issue to the Contractor a NCR, including a response time.

The Contractor shall then respond to that NCR, within the specified time, with proposed resolutions and corrective actions.

The Ministry Representative will accept or reject the proposed resolution and corrective action proposal.

Assurance testing and inspection will be performed to determine if the corrective action has provided an acceptable product. Acceptance and rejection will continue until the Ministry Representative determines that a quality product has been achieved.

A portion of the payment for a Quality Management may be withheld until the NCR issue is resolved or, in accordance with SS 101.07, may be withheld permanently.

Payment for the Work itself may be withheld until the NCR issue is resolved.

**101.05.03 Opportunity for Improvement** – Should the QA review indicate that the Work is not in conformance, but the variance is deemed minor by the Ministry Representative, the Ministry Representative may issue an Opportunity for Improvement (OFI) report.

The Contractor is encouraged to review the findings and undertake such modifications to the QC Plan and the work procedures as necessary to address the issue.

An OFI will not affect payment for Quality Management or for the Work itself.

**101.06 Appeal** – If the Contractor disputes the validity of a finding in an NCR, the Contractor may file an appeal with the Ministry Representative. The Ministry Representative and the Contractor Representative will use all reasonable efforts to refine the area of dispute and to resolve the determination of conformance with the Contract.

If the Ministry Representative and the Contractor Representative cannot come to a mutually agreeable resolution, the Work that is the subject of the Non-Conformance Report shall be re-evaluated by an independent third-party, selected by the Ministry Representative in consultation with the Contractor, at a test frequency equivalent to twice that specified in the Contract or to such other frequency as may be mutually agreed between the Ministry Representative and the Contractor.

If the appeal testing confirms the non-conformance determination, all appeal testing costs will be borne by the Contractor. If the appeal testing shows that the Work did in fact meet the requirements of the Contract, all appeal testing costs will be borne by the Ministry.

**101.07 Payment** – The Lump Sum Price bid for Quality Management shall be full compensation for all costs resulting from the Quality Management requirements set out in the Contract.

Payment will be made on a monthly basis prorated for the percentage of the total Work completed as determined by the Ministry Representative, subject to the Contractor being totally compliant with the requirements of this Section and with its own Quality Control Plan.

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The Ministry Representative, in consultation with the Ministry construction manager following the issuance of a Ministry- issued NCR pursuant to SS 107.05.02 may deduct an amount from any monthly payment so computed, for any quality management work required but not satisfactorily undertaken during that month.

The Ministry Representative may also reduce the total Lump Sum payable by the value of any quality management work required but not satisfactorily undertaken during the Term of the Contract. The foregoing determinations will be made in the sole discretion of the Ministry Representative.

## QUALITY MANAGEMENT

Inspection or testing by the Ministry Representative will be at the Ministry's cost. However, re-inspection or re-testing by the Ministry for repaired or replaced Work items that originally did not meet contract requirements shall be at the Contractor's cost.

Work that is deemed unacceptable in accordance with SS 101.01 will not be eligible for payment from the applicable Item for that Work.

The Completion Certificate will not be issued if there are any unresolved Non-Conformance Reports.

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Manual for Work on Roadways", Special Provisions and Standard Specifications.

**145.23.01 Maintenance of Traffic** – The Contractor shall comply with the requirements of the Transportation Act and amendments thereto and such other Acts, By-Laws or Regulations as are in force for the governing and regulating of traffic or use of any road upon or over which it is necessary to do work or transport materials. The Contractor must arrange to keep roads open to traffic at all times and must cause as little inconvenience as possible to the travelling public.

**145.23.02 Road Closure Notification** – Road closures shall not be permitted until the Contractor requests and receives written permission from the appropriate authority in the Ministry. This request shall be submitted in writing not less than seven days in advance of the closure.

Upon receiving written permission for closure, the Contractor shall notify the local police, fire, ambulance, municipality, school board, and public transit at least 72 hours in advance of the closure.

The Contractor shall notify the public by local radio and newspaper at least 24 hours in advance of the closure.

All costs related to the above shall be for the Contractor's account.

**145.24 Alterations to Drawings and Plans** – It shall be understood that the Drawings and Plans represent the nature and general layout of the work to be executed and not necessarily the works exactly as they will be carried out. The Ministry Representative will, without invalidating the Contract, be at liberty to make reasonable alterations or to furnish any additional or amended Drawings which do not materially change the type of construction.

Payment for any such altered Work will be at the rates set forth in the Schedule 7 Approximate Quantities and Unit Prices.

**145.24.01 Adherence to Drawings** – The various parts of the Work shall be built in strict accordance with the furnished Drawings and with any supplementary Drawings which may be furnished during the progress of the Work as occasion requires.

Special Provisions, special specifications, Standard Specifications and the Drawings/Plans are to be considered as explanatory of each other, but should anything appear in one that is not described in the other, or should any discrepancy appear, no advantage shall be taken of such omission or discrepancy and the decision of the Ministry Representative as to the true intent and meaning of the Special Provisions, special specifications, Standard Specifications and the Drawings in such instances shall be final and binding, it being clearly understood that the Contractor is to execute all the works requisite for the perfect completion of each and all of the several parts of the

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Work according to the true intent and meaning of the Contract.

On all Drawings, in case of any discrepancy between the figured dimensions and the scaled dimensions, the figured dimensions shall govern.

**145.25 Use of Explosives** – In using explosives the Contractor shall exercise the utmost care so as not to endanger life or property and, whenever directed, the number and size of the charges shall be reduced. Before doing any blasting the Contractor shall ascertain if there are in the neighbourhood any railway, power or other lines, water or other pipes, etc., which are likely to be in danger of being damaged. The Contractor shall give to the owner of such lines, pipes or other works timely notice of the intention to blast.

Whenever possible electric batteries shall be employed for simultaneous blasting.

The storage of explosives shall be in accordance with the regulations of the Canada Explosives Act and with any requirements of the representative of the Explosives Regulatory Division within the Mineral Technology Branch of the Minerals and Metals Sector of the Federal Department of the Natural Resources Canada.

**145.26 Work in Pits or Quarries** – The Contractor shall be responsible for compliance with appropriate environmental, forestry, agricultural and other applicable regulatory agencies for all work related to development, operation and reclamation of pit or quarry.

**145.26.01 Ministry Pit or Quarry** - When operating in a Ministry pit or quarry the Contractor shall comply with all provisions of the Mines Act, the Health, Safety and Reclamation Code for Mines in British Columbia, and/or the WCB Occupational Health & Safety Regulation which are applicable to the work undertaken.

145.26.02 Contractor Pit Manager - The Ministry may, at its sole discretion, require that the Contractor, or a party other than the contractor, take responsibility to ensure that the work in the pit or quarry is done in compliance with the requirements of the Mines Act (RSBC 1996) and the Health, Safety and Reclamation Code for Mines in British Columbia (B.C. Reg. 126/94). When the Contractor is so required, the Contractor must provide the name of a person, or persons, who will act as the Pit Manager to the Ministry Representative prior to the commencement of work. This person must possess the qualifications established by the regulations or code, and attend daily at the pit or quarry when it is in operation.

When the role of Pit Manager is not the responsibility of the Contractor, the Contractor will co-operate with, and follow the direction of the acting or appointed Pit Manager.

**145.26.03 Pit Supervisor** - The Contractor shall appoint a properly qualified supervisor or shift boss in any Ministry pit

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as Type C if it cannot be loosened under such an applied load.

The test will be conducted at the Contractor's expense unless the test indicates, to the satisfaction of the Ministry Representative, that the material is Type C. In that case, the cost of the equipment (including mobilization if the equipment is brought in solely for the purpose of the test) and the operator will be paid as Extra Work.

**201.11.04 Type D - All Other Materials** – Type D shall include all other materials of a nature not included in the foregoing definitions of Type A, Type B, or Type C; regardless of the nature or condition of the material or the method used to excavate or remove.

Type D shall also include any unsuitable materials of an organic nature, unless such materials have been specifically set apart in the Contract Special Provisions.

**201.12 Unsuitable Material** – Only material acceptable to the Ministry Representative shall be used in the construction of embankments.

Material deemed unsuitable for the construction may be wasted between the toe of the embankment and the right-of-way boundary or in other areas as designated by the Ministry Representative. If no on-site waste areas are designated then the unsuitable material shall be removed and disposed offsite at the Contractor's expense. Any such material subsequently placed in an embankment, without the approval of the Ministry Representative, shall be removed and disposed of, as directed by the Ministry Representative, and no payment will be made for the removal or haul of such unsuitable material from the embankment.

Where required in the contract all topsoil and organic material shall be stripped over the entire excavation and fill areas and placed in the area between the toe of the embankment and the right-of-way boundary, or on any other area as designated by the Ministry Representative. Topsoil shall meet the requirements of SS 751.16. Organics shall be considered unsuitable material and managed in accordance with SS 201.12. Topsoil shall be stockpiled for later use or disposed of as designated by the Ministry Representative.

All material above or below subgrade in an excavation or in the foundation of an embankment, which in the opinion of the Ministry Representative is unsuitable, shall be removed and paid for as excavation, as classified by the Ministry Representative. Soft clays and peats are typical examples of unsuitable materials.

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Where removal of unsuitable material requires backfilling this work shall be carried out with approved fill materials, as directed by the Ministry Representative. Payment for such backfilling and haul will be made at the Unit Price bid for "Roadway and Drainage Excavation".

Upon completion of the road grade, all topsoil and material suitable for growth of ground cover shall be spread to a nominal depth of 150mm on the cleared right-of-way and up the fill slopes to generally blend in with the cross-section. Care shall be taken that proper drainage is maintained. This material shall be placed, compacted and trimmed to a neat appearance in a manner to facilitate growth of revegetation. No additional payment will be made for replacing and trimming topsoil except that haul in excess of 300 m will be paid in accordance with SS 201.45, SS 201.83 and SS 201.93.

### **201.13 (not used)**

**201.14 Surplus Material** – All suitable excavation material shall, if required, be taken or hauled into the nearest embankment and to any embankment on the project to be constructed out to the extreme distance required by the Ministry Representative.

The surplus beyond what is necessary to form the nearest embankment shall be disposed of by widening embankments uniformly within the limits of right of way, shall be hauled to form or widen any embankment on the road to be constructed, stockpiled on Site or in Ministry pits, or lastly removed from Site for disposal by the Contractor subject to the approval by the Ministry Representative where hauling and placing shall be performed in the most efficient manner. No material shall be wasted without the approval of the Ministry Representative, all surplus material shall be used as much as possible.

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**201.31 Rock Cuts** – See SS 204.

**201.32 Overhanging Rock and Boulders** – The Contractor shall remove overhanging rock or boulders within the excavation limits, as ordered by the Ministry Representative, and shall backfill and compact all resulting cavities to allow the safe passage of construction and support vehicles generally in accordance with the requirements of SS 135. Such work will be paid at the Unit Price bid for "Roadway and Drainage Excavation."

**201.33 Overbreak in Solid Rock** - Overbreak in solid rock excavation encountered in the contract is that portion of any such material which is excavated, displaced or loosened outside and beyond the slopes or grades as staked or re-established (with the exception of slides as



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described in Subsection 201.42).

Any overbreak that occurs due to the inherent character of any formation encountered, as determined by the Ministry Representative in consultation with the Qualified Professional will be classified as allowable overbreak as described in subsection 201.33.01.

All other overbreak, as so defined, shall be removed by the Contractor at the Contractor's expense, and shall be disposed of by the Contractor, in the same manner as provided for "Surplus Material", but at the Contractor's expense without any allowance for overhaul, except as hereinafter stated.

The Qualified Professional is defined as the Ministry's Geotechnical Engineer, Rockwork Engineer, or consultant engineer working for the Ministry whose discipline is in geotechnical engineering.

### **201.33.01 Allowable Overbreak –**

If, and only where directed by the Ministry Representative, use is made of the overbreak to replace material which would otherwise have to be borrowed for the construction of the roadway, then such overbreak will be classed as allowable overbreak.

### **201.33.02 Contractor's Negligence –**

Overbreak resulting from fault or negligence of the Contractor shall be removed and disposed of, as directed by the Ministry Representative, at no cost to the Ministry.

Definition of negligence will be deemed to be lack of following the sequence of operations, lack of a blast design, lack of preblast survey, and lack of as-built blast design as described in 204.04.06, 204.04.07, and 204.04.08 and 204.04.09. Also, definition of negligence will be deemed to mean lack of cut-off holes on the back slope, excessive spacing of drill holes and overloading of same.

### **201.34 (Not used)**

**201.35 Enlargement of Excavation** – In cases where the quantity of material taken from a regular excavation will not be sufficient to form the required embankment, the deficiency shall be supplied by taking material from excavation within or outside the right-of-way, at such places as the Ministry Representative may direct, or from enlargement of the regular excavations made uniformly on one or both sides. The sides of the excavation in all cases shall be dressed to such slopes as the Ministry Representative may require, provided that if the Contractor shall have sloped or scaled such excavation by direction of the Ministry Representative before widening the same, payment for sloping or scaling the second time will be made by Order for Extra Work.

## ROADWAY AND DRAINAGE EXCAVATION

**201.36 Rock Embankments** – This section applies to embankments constructed from material containing more than 15% by volume of rock larger than 150 mm.

Embankments shall be constructed in layers equal in thickness to the largest size of the material but not exceeding 0.7 m. Greater lift thicknesses will be permitted by the Ministry Representative under special conditions provided the Contractor can spread the larger material satisfactorily and attain a degree of compaction no less than attained for layers less than 0.7m in thickness. Regardless of layer thickness and material particle size all material shall be well compacted to the satisfaction of the Ministry Representative.

The material shall be deposited and spread so that the larger rocks are well distributed and the intervening spaces are filled with smaller sizes as may be available to form a stable embankment. The finer portion of excavated rock shall be retained for the top transition layer. Each layer shall be compacted by routing the loading construction equipment over the entire width supplemented with additional compaction equipment, as necessary to ensure compaction is uniform and to the satisfaction of the Ministry Representative.

When a rock embankment is overlain by an earth embankment or by sub-base or base course materials, the top 0.5 m of the rock fill shall be sealed with smaller rock particles and suitable soil materials, if necessary, to prevent the uppermost layers penetrating into voids in this rock embankment.

Where permitted by the Ministry Representative, and where the width is too narrow to accommodate equipment, material for the toe of the side hill rock fills may be placed by end dumping until sufficient width of the embankment has been formed to carry equipment, after which the remainder shall be placed in layers and compacted as specified. Any loose material left on the slopes by end dumping shall be incorporated in the fill and compacted according to these standards.

When embankments are made on hillsides or where a new fill is to be applied upon an existing embankment, the slopes of the embankment or original ground (except rock) shall be terraced in a continuous series of steps a minimum of 1.5 m wide as the embankment rises.

The material from step excavation shall be spread and compacted into the adjoining embankment. No additional payment will be made for excavation or for placing step material in the adjoining fill.

**201.37 Earth Embankments** – This section applies to embankments constructed from material containing less

**SECTION 202**

**GRANULAR SURFACING, BASE AND SUB-BASES**

**TABLE 202-C – AGGREGATE GRADATIONS**

Sieve Size (mm)	Percent Passing (%) Sieve Size													
	Surfacing Aggregate	Base Course									Sub-Base Aggregates			Bridge End Fill
	HFSA	WGB			IGB			OGB			SGSB	IGSB	OGSB	BEF
		25mm	50mm	75mm	25mm	50mm	75mm	25mm	50mm	75mm				
75	---	---	---	100	---	---	100	---	---	100	100	100	100	100
50	---	---	100	---	---	100	55 - 100	---	100	70 - 100	---	55 - 100	70 - 100	30 - 100
37.5	---	---	80 - 100	60 - 100	---	60 - 100	40 - 80	---	75 - 100	50 - 85	---	40 - 80	50 - 85	---
25	100	100	---	---	100	40 - 75	---	100	---	---	---	---	---	---
19	85 - 100	80 - 100	50 - 100	35 - 80	65 - 100	---	17 - 40	75 - 100	35 - 65	15 - 55	15 - 100	17 - 40	15 - 55	20 - 100
12.5	---	---	---	---	---	15 - 40	---	---	---	---	---	---	---	---
9.5	60 - 85	50 - 85	35 - 75	25 - 60	30 - 70	---	---	30 - 65	5 - 35	---	0 - 100	---	---	---
6.3	---	---	---	---	---	---	---	---	---	0 - 20	---	---	0 - 20	---
4.75	40 - 70	35 - 70	25 - 55	20 - 40	15 - 40	---	---	5 - 30	0 - 15	---	---	---	---	10 - 60
2.36	---	25 - 50	20 - 40	15 - 30	10 - 30	10 - 25	10 - 25	0 - 10	0 - 10	0 - 10	---	10 - 25	0 - 10	---
1.18	20 - 50	15 - 35	15 - 30	10 - 20	---	---	---	---	---	---	---	---	---	6 - 32
0.600	---	---	---	---	---	---	---	---	---	---	0 - 100	---	---	---
0.300	10 - 30	5 - 20	5 - 15	3 - 10	5 - 15	5 - 15	4 - 15	0 - 8	0 - 8	0 - 8	0 - 15	4 - 15	0 - 8	4 - 15
0.075	5 - 15	0 - 5	0 - 5	0 - 5	0 - 5	0 - 5	0 - 5	0 - 5	0 - 5	0 - 5	0 - 5	0 - 5	0 - 5	0 - 5

rock.

**204.02.26 Rock** – Rock is Type A material as defined in SS 201.11.01.

**204.02.27 Scaling** – The removal of all loose material using scaling bars, portable hydraulic jacks, other hand tools, wire rope cables, compressed air blow pipes, blasting without the need for drilled holes and other methods authorized by the Ministry Representative.

**204.02.28 Setback Distance** – The setback distance is the horizontal distance between the top of the excavation backslope and the toe of the overburden material. Setback is created by removing overburden.

**204.02.29 Spacing** – The distance between blastholes perpendicular to the burden.

**204.02.30 Stemming** – Material placed on top of the explosive to provide confinement of the explosive gases.

**204.02.31 Subdrill** – The distance drilled below subgrade level.

**204.02.32 Trimming** – The removal by drilling and controlled blasting of potentially unstable rock remaining at the exposed excavation backslope. Trimming may not require backline holes.

### 204.03 Quality Control

**204.03.01 General** – Quality control shall be conducted for all blasting operations.

**204.03.02 Blasting Consultant** – The Contractor shall retain a blasting consultant, acceptable to the Ministry Representative, to provide quality control. The consultant shall not be an employee of the Contractor, explosives manufacturer or explosives distributor.

**204.03.03 Blast Vibration Monitoring** – The Contractor shall provide a blast vibration monitor if required. The blast vibration monitoring shall be under the direction of the Vibration Specialist.

**204.03.04 Quality Control Activities For Blasting Operations** – Quality control for blasting operations shall be performed for test sections, full scale blasting operations and trimming. The Contractor shall provide to the Ministry Representative a copy of the field report generated by the Consultant within one day of each site visit by the Consultant. Quality control for blasting includes, but is not limited to the following activities by the blasting consultant:

- Viewing the proposed blast area at least one (1) week before drilling operations commence.
- Preparing and submitting blast designs for production and backline holes.
- Intermittently viewing the site during drilling for each blast area.
- Intermittently observing the loading of holes with

explosives and tying in to the delay system.

- Observing the blasts and reviewing the excavated areas.
- Attending on site to view the excavation backslope after each lift and reviewing excavation backslope for quality control purposes.
- Viewing the site while reviewing proposed changes to the blast design and preparing new designs.
- Attending on site at other times as are appropriate to assist the Contractor in the setting up, assessment and adjustment of the various procedures to be employed for blasting.
- Preparing a field report for each site visit, including details of the progress of blasting operations, a statement whether the blast design is being complied with, any changes to the blast design, any recommendations made to the Contractor and any problems encountered by the Contractor.

### 204.04 Submittals

**204.04.01 General** – Review of submittals by the Ministry shall not relieve responsibility from the Contractor for the accuracy and adequacy of the submittals. Submittals are for quality assurance and record keeping purposes. Inadequate or incorrect submittals will be returned for revisions prior to acceptance. The Contractor shall submit to the Ministry Representative the following documentation for review.

**204.04.02 Qualifications and Experience of Contractor** – Prior to the pre-construction meeting, the Contractor shall provide a statement of the qualifications, experience and work function of all personnel assigned to drilling and blasting duties. A statement of previous work experience on similar projects shall also be provided. This statement shall include the project name, location, volume of rock, year constructed and the owner/client contact name. The company, the driller and the blaster shall each have a minimum of 5 consecutive years demonstrated experience in drilling and controlled blasting work on at least 3 projects involving rock cuts over 8 m height along transportation corridors.

**204.04.03 Qualifications and Experience of Proposed Blasting Consultant** – By the pre-construction meeting, the Contractor shall provide the name of the consulting firm, and the name and qualifications of the blasting consultant's on-site representative who will be providing the quality control for rock excavation. The blasting consultant shall have a minimum of 5 consecutive years demonstrated experience in preparing successful blast designs along transportation corridors for at least 3 projects. The following information shall be included in the qualifications submitted:

- Project name, location and experience.
- Name and phone number of owner/client contact who

**TABLE 205-B APPROXIMATE AVERAGE DIMENSION OF AN ANGULAR ROCK FOR EACH SPECIFIED ROCK CLASS MASS (Sg=2.640)**

CLASS (KG)	APPROX. AVERAGE DIMENSION (mm)		
	15%	50%	85%
10	90	195	280
25	120	260	380
50	155	330	475
100	195	415	600
250	260	565	815
500	330	715	1030
1000	415	900	1295
2000	525	1130	1630
4000	660	1425	2055

**TABLE 205-C RECOMMENDED TESTS FOR RIPRAP QUALITY**

Property	Test Designation	Allowable Value
Specific Gravity	ASTM D6473	$\geq 2.60$
Absorption	ASTM D6473	$\leq 1\%$
Soundness by use of Magnesium Sulphate	ASTM D5240	$\leq 10\%$ (following 5 cycles)
Micro-Deval Abrasion Loss Factor	ASTM D6928	$\leq 20\%$

At the toe of sloped riprap, a sufficient number of the larger rocks shall be placed to form a firm foundation approximately 50% thicker than the required nominal riprap thickness. The remaining larger rocks shall be regularly spaced, at least one every 2.5 m<sup>2</sup>, when placing the general rock mass to the nominal or required thickness over the area indicated. Smaller rocks or spalls shall be

well hammered in to fill the interstices and to form a closely massed regular surface.

Where riprap is required in two layers, the rocks shall be laid up and generally lap jointed between the regularly spaced larger rocks placed as through headers.

**205.08 Grouted Riprap** – Where grouted riprap is shown or required, the surfaces of the rocks shall be cleaned and wetted and the interstices filled with cement mortar, well rodded and pounded in for a minimum mortar depth of 300 mm or as otherwise detailed or required by the Ministry Representative. The mortar shall consist of one part Portland cement to three parts well-graded clean fine aggregate mixed to a proper consistency.

#### MEASUREMENT

**205.09 Measurement** – Measurements shall be made by multiplying the facial area by the average thickness dimensions as shown on the Drawings or as directed by the Ministry Representative. No allowance will be made for the quantity of rock placed in excess of these dimensions.

#### PAYMENT

**205.10 Payment** – Payment shall be on the basis of the Unit Price bid per cubic metre for the type and class of riprap specified or required. The Unit Price bid shall be accepted as full compensation for everything completely furnished and done in connection therewith, but shall not include the excavation for foundation, which shall be paid for under "Roadway Drainage and Excavation" or "Foundation Excavation", whichever is specified in the Contract.

Where the source of supply for the riprap is off-Site or outside the design excavation limits as shown on the Drawings, the Unit Price for Riprap shall include all costs to develop the source and produce the riprap.

Where the source of supply is on-Site and within the design excavation limits as shown on the Drawings, payment to excavate the rock for riprap will be included within the Contract Unit Price for Type A or Type B, as defined in SS 201, as appropriate to the source.

Haul and overhaul are incidental to Unit Prices indicated above unless Schedule 7 includes an Overhaul Item.

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**PORTLAND CEMENT CONCRETE**

- allow patches to attain an initial set.
- keep surfaces saturated with water for 60 minutes before applying mortar.
- remove free water from surfaces.
- apply mortar, proportioned as specified in SS 211.17.05 and mixed at least 60 minutes before application, to the concrete surfaces with a sponge, float or a hand carborundum stone, and work mortar well into the surfaces.
- allow mortar to dry 30 - 60 minutes.
- remove residues from the surfaces by rubbing with clean dry burlap but with no addition of neat cement to the surface during the "sacking" operation and finally cure the surfaces as specified in SS 211.15.

**Table 211-M DIMENSIONAL TOLERANCES**

Trueness of bearing surfaces	such that there is no gap over 1 mm under a 1 m straight edge
Trueness of bridge deck surfaces	such that there is no gap over 3 mm under a 3 m straight edge
Trueness of slope pavement surfaces	such that there is no gap over 12 mm under a 3 m straight edge
Trueness of other surfaces exposed to view	such that there is no gap over 12 mm under a 3 m straight edge
Curbs and parapets	such that there is no gap over 3 mm under a 3 m straight edge
Horizontal distance to concrete surfaces	±50 mm
Elevations of concrete surfaces except bearings and decks	±25 mm
Elevations of bridge deck surfaces	±15 mm
Elevations of bearing surfaces	±5 mm
Variation from plumb	1:400, but not more than 30 mm
Dimensions of members over 10 m	±25 mm
Dimensions of members under 10 m	-6 mm, +15 mm
Location of anchor bolts	± 6 mm
Projections of anchor bolts, other embedments	±13 mm

**NOTE:** The tolerances listed in Table 211-M are acceptable only in so far as they do not prevent the proper fit of structural members.

**211.17.03 Class 3 Finish** - Class 3 Finish is to be produced on all formed surfaces exposed to view from close distances, such as surfaces of curbs and parapets, and to any surface for which a Class 3 finish is specified. A Class 3 finish shall provide surfaces of uniform colour and texture when viewed from less than 15 m.

In order to produce a Class 3 finish, the formwork shall render a true smooth surface, free from fins and projections. New plywood or steel is necessary to produce the required finish. Re-use of plywood forms will be permitted only if in an "as new" condition. Repairs to the forms shall be with full panels of

## SECTION 211

sheathing only.

All ties, bolts, nails and other metal specifically required for construction purposes shall be removed or cut back to a depth of 50 mm from the surfaces of the concrete and the resulting holes filled.

No dry ties shall be permitted; form tie rods shall remain embedded and terminate not less than 50 mm from the formed face of the concrete. Removable embedded fasteners on the ends of the rods shall be such as to leave holes of a regular shape for reaming and filling.

Patching shall be:

- patch installation projecting slightly from the surrounding concrete surface.
- after 24 hours, saturated and carefully finished to render the surfaces of the patch true to the surrounding concrete, but any grinding using a hand carborundum stone kept to a minimum.

When a rubbed finish is required, the applied mortar shall be carefully worked into the surface area being finished and, using a hand carborundum stone manipulated in a circular motion, the entire surface rendered true and smooth with all excess mortar removed.

**211.17.04 Class 3 Finish Alternative Procedures** – Class 3 Finish alternative procedures when, in the opinion of the Ministry Representative, the formwork may safely be removed at an early age and the concrete finished while still partly plastic, shall include the following:

- careful removal of the formwork when the concrete has sufficiently hardened so as to hold its shape.
- finishing the surfaces immediately (within 4 to 8 hours of casting, depending upon weather).
- careful rubbing of the concrete surfaces with a carborundum stone, occasionally wetting same to produce a paste from the surface of the concrete.
- rubbing continued, adding necessary sand-cement mortar in small quantities to fill voids, until all voids and form marks are removed.
- surface curing as specified.

Modifications to the surface texture shall be achieved by grinding or other means.

**211.17.05 Patching Mortar** – Patching mortar where specified above shall be constituted as follows:

Cement:	60% Normal Portland 40% White Normal Portland
Liquid:	70% Water 30% Latex Bonding Agent
Sand:	Passing a 1.25 mm sieve

**NOTE:** Cement blend above may be adjusted to provide close BC MoT

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match to the concrete colour.

### 211.18 Hot Weather Concreting

When ambient air temperature is 25°C or higher or there is a probability of it rising to 25°C during the placing period (as forecast by the nearest official meteorological office), hot weather concreting procedures as outlined below, shall be used, for all concrete other than deck concrete. Additional requirements for hot weather concreting for bridge decks including diaphragms, bridge parapets, bridge medians, bridge sidewalks and approach slabs are given in SS 413, Bridge Decks and Concrete Overlays.

Prior to the placement of concrete, the Contractor shall submit to the Ministry Representative for acceptance, the proposed placing operations complying with the requirements for hot weather concreting.

Curing shall be accomplished by water spray or by using saturated absorptive material, such as burlap.

Formwork, reinforcement and concreting equipment shall be protected from the direct rays of the sun or cooled by fogging and evaporation.

Concrete for piers, abutments and footings of bridges shall not have a temperature greater than 25°C at any time prior to placement and curing.

The initial temperature of concrete prior to placement may be estimated from the temperatures of its ingredients by using the following equation:

$$T = \frac{0.22(T_a M_a + T_c M_c) + T_w M_w + T_{wa} M_{wa}}{0.22(M_a + M_c) + M_w + M_{wa}}$$

where  $T_a$ ,  $T_c$ ,  $T_w$  and  $T_{wa}$

= temperature in °C of aggregates, cementing materials, added mixing water, and free water on aggregates, respectively

where  $M_a$ ,  $M_c$ ,  $M_w$  and  $M_{wa}$

= mass in kilograms of aggregates, cementing materials, added mixing water, and free water on aggregates, respectively

If deemed necessary, the Contractor shall employ the following hot weather concreting procedures to reduce the concrete temperature:

#### a) Mixing Water

- Shading of storage tanks and water supply lines;
- Refrigeration of mixing water; and/or
- Adding cubed, shaved or chipped ice directly to the concrete mixer drum, and ensuring ice is of a particle size to be completely melted before the concrete is discharged from the

**412.11.02 Epoxy-Coated Reinforcing Steel** – Epoxy-coated reinforcing steel bars shall conform to the requirements of ASTM A 775M and D 3963M. Application plants shall be certified under the Concrete Reinforcing Steel Institute (CRSI) Voluntary Certification Program for Fusion-Bonded Epoxy-Coating Applicator Plants, and proof of certification shall be submitted to the Ministry Representative. All epoxy-coated bars shall be clearly labelled with the name of the manufacturer, the primer and the coating system used and the date of production. The method of labelling shall be determined by the applicator plants and test certificates of performance of epoxy coated bars shall be submitted to the Ministry Representative.

Further to paragraph 9.2 of ASTM D 3963, the identification marks on all epoxy coated reinforcing bars shall be maintained from the point of delivery until they are incorporated into the structure.

The Ministry Representative may require samples of epoxy resin and epoxy patching material for acceptance testing as called for in ASTM A 775M. The Ministry Representative may require tests of coated bars as called for in ASTM A 775M.

Tie wire used to tie epoxy coated reinforcing bars shall be epoxy coated wire.

**412.11.05 Stainless Steel Reinforcing Bar**

Stainless steel reinforcing bars and spirals shall conform to ASTM A276 and ASTM A955M, minimum Grade 420, except as noted. Nominal dimensions, unit masses and deformation requirements for Metric bar sizes shall conform to CAN/CSA G30.18.

Stainless steel reinforcing bars shall be deformed unless indicated otherwise on the Drawings.

Stainless steel reinforcing bars shall be of a stainless steel type specified in Table 412-B.

**TABLE 412-B: TYPES OF STAINLESS STEEL**

TYPE / ASTM DESIGNATION	UNS DESIGNATION
316 LN – A955	S31653
DUPLEX 2205 – A955	S31803
DUPLEX 2304*	S32304

\* Chemical composition shall be within the ranges identified in Table 1 (Typical Composition %) of and in conformance to the requirements of ASTM A276. The dimensioning and mechanical properties shall be in conformance with ASTM A955M.

Unless otherwise specified, only one type of stainless reinforcing steel shall be supplied for use throughout the project.

Stainless steel reinforcing bars shall be hot-rolled, de-scaled and pickled to the required mechanical properties and dimensions.

Stainless steel reinforcing bars shall be free of deposits of iron and non-stainless steel.

Fabrication of stainless steel reinforcing bars shall be such that the bar surfaces are not contaminated with deposits of iron and non stainless steel and that the surfaces are not damaged due to straightening from coil.

Tie wire used to tie stainless steel reinforcing bars shall be stainless steel wire of a type listed in Table 412-B except that tie wire used to tie stainless steel reinforcing bars to epoxy coated reinforcing steel bars shall be epoxy coated wire. Tie wire shall be 1.6mm in diameter.



## SECTION 415

### MANUFACTURE AND ERECTION OF PRECAST AND PRECAST PRESTRESSED CONCRETE MEMBERS

#### DESCRIPTION

**415.01 Scope** – This Section covers the manufacture and erection of precast and precast prestressed concrete members.

#### 415.02 General

**415.02.01** The manufacture and erection of precast and precast prestressed concrete members shall conform to the requirements of these specifications and details as shown on the Drawings.

**415.02.02** Precast concrete elements shall be manufactured in plants certified to the current CSA A23.4 requirements in the appropriate category. Certification shall be by the Canadian Precast Prestressed Concrete Institute (i.e. CPCI Precast Concrete Certification Program for Structural, Architectural and Speciality Precast Concrete Products and Systems) or by a certification organization accredited by the the Standards Council of Canada (ie. Canadian Standards Association (CSA)) Certification shall be in effect prior to the beginning of Work, and maintained throughout the period of manufacture.

**415.02.03** Materials and construction shall conform to the current CSA A23.4 and the current PCI "Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products ". Where there is a discrepancy between the requirements of these two standards, the more stringent shall apply. In cases where it may be unclear as to which standard is more stringent, the Ministry Representative in consultation with the Ministry Chief Bridge Engineer will have the final say.

**415.03 Prefabrication Meeting** – The Ministry will at it's discretion, convene a prefabrication meeting with the Contractor to review issues such as, but not limited to, lines of communication, fabricator and sub-fabricator scope of work, location of all work, procedures on quality control, plant certification, concrete source and mix designs, use of Hydration Stabilization Admixtures (if applicable), mill certificates, alternate details and procedures, and any other specific requirements of this specification as it relates to the Work.

**415.04 Working Drawings** – Working drawings shall consist of the following:

- Shop drawings,
- Transportation details, and
- Erection drawings

Transportation details and erection drawings shall be

prepared and sealed by a professional engineer registered with Association of Professional Engineers and Geoscientists of British Columbia (APEGBC).

Shop drawings shall be prepared and sealed by a professional engineer registered with APEGBC when the Contractor is responsible for the design of items that are detailed on the shop drawings.

Working drawings shall be in the same system of units as the design drawings.

Working drawings shall be on D size sheets approximately 560 mm (22") by 865 mm (34"), (one drawing per sheet). Lettering for notes and dimensions shall be at least 2.5 mm and 4 mm for headings. Drawings shall be legible when half-sized or microfilmed.

**415.04.01 Shop Drawings** – Shop drawings shall show all information and details needed for the fabrication of the members including, but not limited to, such items as member shapes and dimensions, mark numbers and general arrangement of member locations, mass, prestressed and non-prestressed reinforcement, embedments, openings, block outs, chamfers, recesses, finishes, concrete mix design, stressing details, special tolerances, special handling instructions, lifting details and lifting locations.

**415.04.02 Transportation Details** – Transportation details shall include such items as:

- Description of hauling and handling equipment,
- Weight of members,
- Length and height of loads,
- Location and method of member support, and engineering calculations where members are to be supported during transportation further from their ends than outlined in SS 415.48,
- Details for handling, storing, and loading of members.

#### 415.04.03 Erection Drawings

Erection drawings shall show in detail the method of erection including, but not limited to, the following:

- Erection procedures
- Procedures for off loading of members upon delivery
- Details for temporary storage and support of members on site prior to erection
- Equipment to be used
- Layout or general arrangement drawing showing the layout of the members, equipment positioning, and access

**SECTION 502**

**ASPHALT PAVEMENT CONSTRUCTION (EPS)**

**TABLE 502-H – PAYMENT ADJUSTMENTS FOR MATERIAL APPLICATION RATE**

Actual Application Rate (Percent of specified rate)	Payment Adjustment \$ per tonne of material in the Lot (unless otherwise noted)	
	Bottom Lift or Single Lift	Top Lift of Multiple Lifts
≥ 110	-\$7.00 for all material in the Lot up to 110% and no payment for product in excess of 110.0%	-\$7.00 for all material in the Lot up to 106% and no payment for product in excess of 106.0%
≥ 106.0 to <110.0	-\$5.00	-\$5.00
≥ 105.0 to <106.0		
≥ 104.0 to <105.0	-\$1.00	-\$3.00
≥ 96.0 to <104.0	+\$0.50	+\$0.50
≥ 94.0 to <96.0	-\$2.00	-\$2.00
≥ 92.0 to <94.0	-\$3.00	-\$3.00
≥ 90.0 to <92.0	-\$4.00	-\$4.00
≥ 85.0 to <90.0	-\$7.00	-\$7.00
<85.0	<b>REJECT</b>	<b>REJECT</b>

Representative and the Contractor shall evaluate the first two Lots upon completion of the second Lot, after opening to traffic, to confirm the “agreed to” guidelines. Segregation will then be evaluated only when all paving is complete.

The Ministry Representative, with the Contractor’s Representative, will observe the finished pavement to evaluate the existence, severity and extent of segregation and other surface defects. The evaluation will be completed prior to the issuance of the Completion Certificate

The rating system for categorizing the severity of Top Lift surface segregation, and repair methodology is shown in Table 502-I-1.

**502.56.04 Payment Adjustments** – The payment adjustment for Top Lift segregation will be the applicable amount shown in Table 502-I-2.

**502.56.05 Repair** – On Top Lift all segregation, including any areas outside the driving lanes assessed for the payment adjustment, shall be repaired according to Table 502-I-1.

**502.56 Surface Segregation**

**502.56.01 Lot** – A Lot shall be one kilometre length of Top Lift pavement for each driving lane.

**502.56.02 Sub-Lot** – Sub-Lots are not used for segregation.

**502.56.03 Determination of Surface Segregation** – The finished pavement shall be homogeneous, free from segregation and shall be uniform with respect to surface texture. A segregated area is defined as an area within the driving lanes of the pavement wherein the texture differs visually from the texture of the surrounding pavement.

Due to the nature of variation in asphalt mixes and their compactive characteristics, the definition of degrees of segregation will be established on a project by project basis. The Contractor and the Ministry Representative shall establish using photographs or other mutually agreed upon tools, the definition of slight, moderate and severe segregation. The Ministry

## SECTION 505

### USE OF RECLAIMED ASPHALT PAVEMENT IN ASPHALT PAVEMENT CONSTRUCTION

#### 505.01 Preliminary and General

The work covered by this section covers the use of Reclaimed Asphalt Pavement (RAP) material in hot mix asphalt construction. This specification allows for the use of both Classified and Unclassified RAP.

The contractor's development and processing of RAP into an end paving product must meet SS 502 Asphalt Pavement Construction (EPS) for Highway Construction.

The maximum allowable percentage of RAP allowed in asphalt pavement will be based on the classification of the roadway and the location of the mix in the pavement structure or as identified in the Special Provisions.

#### 505.02 Roadway Categories

Roadways are divided into the following 2 categories:

- Category A – All numbered Highways.
- Category B - Other Roads.

The roadway Category shall be identified in the Special Provisions.

#### 505.03 Definitions

**Reclaimed Asphalt Pavement (RAP)** – Removed and/or reprocessed pavement materials containing asphalt and aggregates. These materials are generated when asphalt pavements are removed for reconstruction and/or resurfacing. When properly screened and crushed, it consists of high quality aggregate coated by asphalt cement.

**Classified RAP** – RAP obtained from Ministry roadways will be termed as Classified RAP.

**Unclassified RAP** – RAP obtained from non-Ministry sources or mixed with RAP from other sources.

**Rheology** - is the study of deformation and flow of matter. For asphalt binder rheology, it refers to the flow characteristics of the asphalt binder in the asphalt mix. Deformation and flow of the asphalt binder in asphalt mix is important in determining asphalt pavement performance.

BC MoT

#### 505.04 Allowable RAP Addition Rates

The maximum RAP allowed in the asphalt mix shall be determined by the contribution of the RAP Asphalt Cement (AC) towards the total AC content in the mix by weight as per the percentages specified in Table 505-A. The Contractor shall notify the Ministry Representative, 14 days in advance of Paving if RAP will be used in the project, and shall fill all fields as applicable and sign this Appendix II – RAP RECORD SHEET and submit it to the Ministry Representative 10 days in advance unless the project Special Provisions state differently.

**Table 505-A: Maximum Percent RAP AC Replacement allowed in Asphalt Mix**

Road Classification	Top Lift	Lower Lifts
Category A	15	30
Category B	30	30

The amount of total AC replaced by AC in the RAP will be calculated as follows:

$$\% \text{ AC Replacement} = \frac{(a \times b)}{c}$$

Where;

**a** = AC content of RAP

**b** = RAP percent in mixture by total weight of mix

**c** = Total Percent AC content in mixture

Inclusion of RAP into the hot mix asphalt will be as per the maximum allowable percentage of AC replacement unless otherwise noted in the Special Provisions.

#### 505.05 Materials

##### 505.05.01 RAP

The Contractor shall fulfill or exceed the requirements of SS 505 Appendix 1 – RAP Management Best Practices for the management of RAP materials from the time of collection through processing, mix design and quality control practices during the production of asphalt mixtures containing RAP and the Contractor

shall provide documentation to the Ministry Representative that best practices have been followed in the handling, classification, and storage of RAP material, prior to being allowed to use the RAP.

#### 505.05.02 Asphalt Cement

When the Percent RAP AC Replacement amount is greater than 15%, the blended AC must meet the penetration and viscosity requirements of the specified asphalt cement specified in the Special Provisions (when penetration graded asphalt cement is specified) or the temperature requirements of the specified Performance Graded Asphalt Cement (PGAC) when a PGAC is specified or substituted for penetration graded asphalt cement.

#### 505.05.03 Use of Rejuvenators

Usage of Softening agents, rejuvenators or recycling agents will not be permitted.

#### 505.05.03 Use of Recycled Asphalt Shingles

Usage of Recycled asphalt shingles will not be permitted.

#### 505.06 RAP Sampling

Sampling of the RAP shall be as per SS 505 Appendix 1 – RAP Management Best Practices.

#### 505.07 Quality Control

The quality control testing requirements for RAP shall be based on the percent of AC replacement in the asphalt mix as per the requirements listed in Table 505-B and the Minimum test frequency guidelines for Quality Control listed in (Table 505-C in Appendix I)

#### 505.07.01 RAP Aggregate Testing

##### a) Basic Tests

The following basic properties shall be determined for the proposed RAP:

- Moisture Content;
- Asphalt Content;
- Gradation;
- Percent Fracture; and
- Specific Gravity of coarse and fine fractions (for mix design purposes).

Individual representative RAP samples shall be tested to determine moisture content, gradation, percent

fracture and asphalt content.

Tests to determine the specific gravity of the coarse and fine fractions of RAP shall be completed on the combined aggregates (obtained by combining the individual reclaimed aggregates retained after the extraction of the asphalt cement).

##### b) Consensus Tests

The tests for the consensus properties shall be completed on the combined aggregates (virgin aggregates and reclaimed aggregates) mixed in the proportions proposed for the mix design.

The following aggregate consensus properties shall be determined for the combined aggregate samples:

- Maximum Micro Deval Abrasion loss factor (%);
- Standard Test Methods for un-compacted void content of fine aggregate (as influenced by particle shape, surface texture and grading) (ASTM C1252); and
- Percentage of flat and elongated particles (for Superpave mixes only).

#### 505.07.02 AC Rheology Testing

When AC rheology testing and design is required, the blended AC must meet the penetration and viscosity requirements of the specified AC type. For penetration graded asphalt, rheology is measured in terms of penetration at 25°C and viscosity at 60°C. For performance grade asphalt cements (PGAC), rheology is tested as per the procedures outlined in AASHTO MP1 and reported in terms of high and low temperature service ratings, i.e. PG 58-34.

Since the rheological properties of asphalt binder vary with temperature, rheological characterization involves two key considerations:

- To compare different asphalt binders, their rheological properties must be measured at some common reference temperature.
- To fully characterize an asphalt binder, its rheological properties must be examined over the range of temperatures that it may encounter during its life.

For mixes specified to use PGAC, the blended AC must meet the temperature requirements of the specified PGAC. For asphalt mixtures containing RAP and specified to use Performance Graded (PG) asphalts, the RAP rheology and the grade of virgin asphalt to be used shall be determined according to Appendix X1 of AASHTO MP2.

**505.07.03 Quality Control Testing**

**Table 505-B: Quality Control Testing Requirements**

Classified RAP	% AC Replacement	Required Tests
	≤ 15%	<ul style="list-style-type: none"> <li>• Basic Tests</li> </ul>
Unclassified RAP	> 15%	<ul style="list-style-type: none"> <li>• Basic Tests</li> <li>• Consensus Tests</li> <li>• AC Rheology Testing</li> </ul>
	≤ 15%	<ul style="list-style-type: none"> <li>• Basic Tests</li> <li>• Consensus Tests</li> </ul>
Unclassified RAP	> 15%	<ul style="list-style-type: none"> <li>• Basic Tests</li> <li>• Consensus Tests</li> <li>• AC Rheology Testing</li> </ul>
	≤ 15%	<ul style="list-style-type: none"> <li>• Basic Tests</li> <li>• Consensus Tests</li> </ul>

- All RAP aggregate gradations for each RAP product;
- Asphalt Content for RAP;
- Results for Consensus properties of combined aggregates as specified in Section 505.07.01 (when applicable);
- Design RAP Rheology test results; and
- Blending Charts for the virgin and reclaimed AC. (when applicable)

Should a change in the source or addition rate of RAP be made after the mix design has been approved, a new mix design and/or job mix formula shall be submitted to the MoT for review.

**505.09 Payment Adjustments**

SS 502 PART F – PAYMENT ADJUSTMENTS shall

apply to all work utilizing reclaimed asphalt pavement in the asphalt mix unless otherwise specified in the Special Provisions.

**505.08 Asphalt Mix Design**

RAP shall be included at the proposed addition rates during the mix design. The Contractor shall submit a mix design to the Ministry Representative for review at least 5 business days prior to the start of asphalt mix production.

In addition to the information required in SS502.08.04 - Asphalt Mix Design Submittals, the following information shall be provided in the mix design submittal for the asphalt mixes containing RAP:

## SS 505 APPENDIX 1

## RAP MANAGEMENT BEST PRACTICES

A **best practice** in the context of this Standard Specification is a method or technique that has consistently shown results superior to those achieved with other means, and that is used as a benchmark. A "best" practice may evolve to become better as improvements are discovered. Best practice is considered to describe the process of developing and following a standard way of doing things that are commonly achieved in the industry.

**RAP Sources** - RAP may be obtained from several sources. The common sources of RAP are:

**Cold Milling** – This is the most common source of RAP. The milling process should be closely examined to make sure that the milled material is not contaminated with soil, base materials, paving geotextiles or other foreign material (sulphur, asbestos, rubber etc.). The milled material that becomes contaminated should be stockpiled separately from RAP to be used in asphalt mix.

A special milling operation may also be beneficial when it is desirable to mill the surface layer in one pass and the underlying layers in a second pass because the surface course millings may contain aggregates with higher fractured aggregates that could be incorporated in the new surface layers.

**Full Depth Pavement Removal** – RAP can also be obtained from the removal of the existing pavement using a bulldozer or a backhoe. This process typically results in large chunks of pavement that may be contaminated with underlying soils. This contaminated material should be stored in a separate stockpile and not to be used in the hot mix asphalt.

**Asphalt Plant Waste** – This includes the waste generated during plant start-up, transition between mixes, plant clean out, mix rejected from projects and excess mix produced that could not be placed.

This material usually has fewer fines than the typical RAP since it wasn't milled or broken up during pavement removal and the AC is less aged than RAP since it hasn't been subjected to environmental aging.

This material should be stockpiled and tested separately from the other RAP.

**RAP Contamination** – Best practice for RAP stockpiles is to keep them free from contaminants. RAP stockpiles should be treated as a valuable material. Truck drivers bringing the material on the site should ensure that unwanted debris or contaminated material does not end up in the RAP stockpile.

The plant QC personnel and the loader operators should continuously monitor processed and unprocessed RAP stockpiles to make sure that they do not contain deleterious materials. If any contaminants are found, they should be removed immediately so that they are not covered up with other RAP brought on to the yard.

**RAP Categories** – RAP obtained from MoT sources is referred to as **Classified RAP**. RAP obtained from non MoT sources or mixed with RAP from other projects is referred to as **Unclassified RAP**.

**RAP Processing** – Best practice for RAP processing involves one or more steps to create consistent materials. Screening is used to separate sizes. In some cases, it may be desirable to screen or fractionate RAP to coarse and fine fractions. RAP separation based on sizes increases quality and reduces variability in the RAP properties.

For stockpiles of RAP from multiple sources, particularly stockpiles containing oversize fragments of RAP or pavement slabs, the material should be processed to produce RAP with a maximum size of 37.5 mm for use in hot mix asphalt.

Further processing of RAP may include both screening and crushing to produce a uniform gradation, AC content and other properties. Since crushing RAP will create more aggregate fines, it is best to set up the crushing operation so that the RAP is screened before it enters the crusher.

RAP processing shall occur as early as possible in the construction planning process.

**RAP Stockpiling** – The best practice to minimize the accumulation of moisture in stockpiles is to cover the stockpile with a shelter, tarp or building to prevent precipitation from getting to the RAP.

## APPENDIX 1 - RAP MANAGEMENT BEST PRACTICES

RAP stockpiles should be placed on a base with adequate drainage and constructed with minimal segregation. Arc-shaped, conical, uniform stockpiles are preferred for storing processed or unprocessed RAP. No contamination of the RAP from the stockpile base materials should occur.

Use of heavy equipment on top of the RAP stockpile should be minimized to avoid compaction of the RAP. It is also recommended that the RAP stockpiles be limited to 4 m in height to reduce the potential for self-consolidation of the stockpile.

**RAP Sampling** - Best practice is for representative RAP samples to be collected from the stockpile prepared for the project. At least one sample per 750 tonnes of RAP in the stockpile or a minimum of ten samples per stockpile should be taken and retained for testing.

If the asphalt mix from an existing pavement is to be used as RAP, 150 mm diameter cores should be extracted at a frequency of at least one core every 1.5 kilometer in each lane prior to the start of the project. The asphalt mix from the pavement lift to be recycled should be tested to determine the properties of the aggregates and the asphalt cement in the pavement.

**Sampling Method** – Best practice for sampling aggregates applies to the sampling of RAP as well. RAP stockpiles should be sampled as they are being built at the location where they will be fed into the asphalt plant. Sampling at the time the stockpile is built is the best practice and will be easier and more representative of the stockpile compared to samples taken later after the formation of the crust on the face of the RAP stockpile.

Proper sampling procedures normally used for virgin aggregates should also be used to sample RAP aggregates as included in “AASHTO T2: *Sampling of Aggregates*”, *Standard Specifications for Transportation Materials and Methods of Sampling and Testing, 30<sup>th</sup> Edition*.

**Minimum Test Frequencies** – The quality control tests on the RAP and the extracted aggregates should be completed at the minimum frequencies specified in Table 505-C: Guidelines for Minimum Quality Control Test Frequencies.

All RAP aggregates retained after extraction should be combined together into one sample. The combined sample should then be sieved and split into coarse and fine fractions and used to determine the specific gravity of the recycled aggregates.

**Stockpile Management** – When a stockpile reaches the desired quantity and has been sampled and characterized, no additional RAP material should be added to it. Subsequent RAP material should be stockpiled in a separate stockpile and characterized in the same manner. This process should continue such that characterized stockpiles are not compromised by new RAP materials.

Samples from the RAP stockpile should be taken and the testing completed as per the minimum test frequencies specified in Table 505-C.

**Table 505-C: Guidelines for Minimum Quality Control Test Frequencies**

Test	Minimum Frequency
Asphalt Content	One per 750 tonnes
Gradation	One per 750 tonnes
Percent Fracture (%)	One per 750 tonnes
Specific Gravity of coarse fraction of RAP	Minimum of One per 3000 tonnes or three per stockpile
Specific Gravity of fine fraction of RAP	Minimum of One per 3000 tonnes or three per stockpile
Maximum Micro Deval Abrasion loss factor (%)	Minimum of One per 3000 tonnes or three per stockpile
Fine aggregate angularity	Minimum of One per 3000 tonnes or three per stockpile
Flat and elongated particles (For Superpave Only)	Minimum of One per 3000 tonnes or three per stockpile
AC Rheology	Minimum of One per 3000 tonnes of RAP or a minimum of three tests per project.

**SS 505 APPENDIX II  
RAP RECORD SHEET**

**This Appendix is part of the Standard Specification SS 505.** The Contractor shall notify the Ministry Representative unless the project Special Provisions state differently, 14 days in advance of Paving if RAP will be used in the project, and shall fill all fields as applicable and sign this Appendix II – RAP RECORD SHEET and submit it to the Ministry Representative 10 days in advance unless the project Special Provisions state differently.

Contractor:

Ministry Representative:

Project Name per Signed Contract:

Project Number:

Numbered Highway Name: (if Applicable)

Road Name: (If Applicable)

Segment No.	Tonnage	RAP percentage	Classified RAP	Unclassified RAP	Top Lift %	Bottom Lift %	Left/Right LKI	Start LKI	Finish LKI

Filled by (Name and Date):

Address and Contacts

Submitted by:

Name:

Signature and Date:



## SECTION 508

**508.62 Asphalt Emulsion** – Asphalt emulsion will be measured and paid in litres of emulsion actually sprayed on the road, including supply, storage, heating and handling.

**508.63 Aggregates** - Aggregates will be measured by the cubic metre in stockpile. The volume will be determined by surveying and surface-to-surface volume calculations. Measurement shall be performed by the Contractor at the Contractor's expense using an independent surveying company. Survey results must be verified and signed off by the independent surveying company and survey results must be supplied to the Ministry.

Payment for aggregates will be at the Contract Unit Price per cubic metre in stockpile. Payment for aggregate will be only up to 100% of the Approximate Quantity as stated in Schedule 7.

No payment will be made for the supplying, hauling and placing of blinding sand.

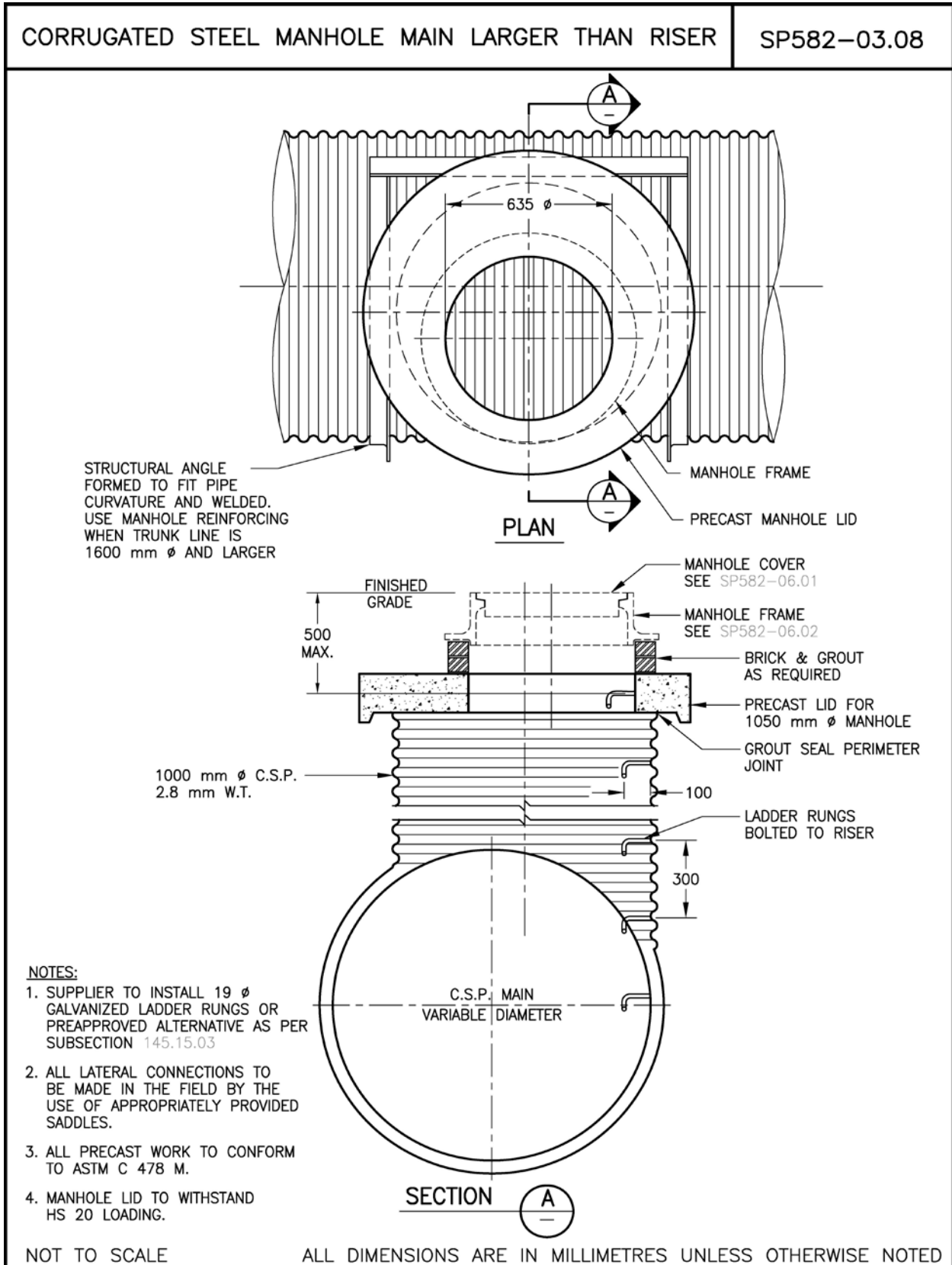
The supply of extra aggregate, required to repair or overlay Unacceptable Work, will be the Contractor's responsibility. Where sufficient aggregate quantities are remaining in stockpile, the Ministry will make these available at no cost to the Contractor.

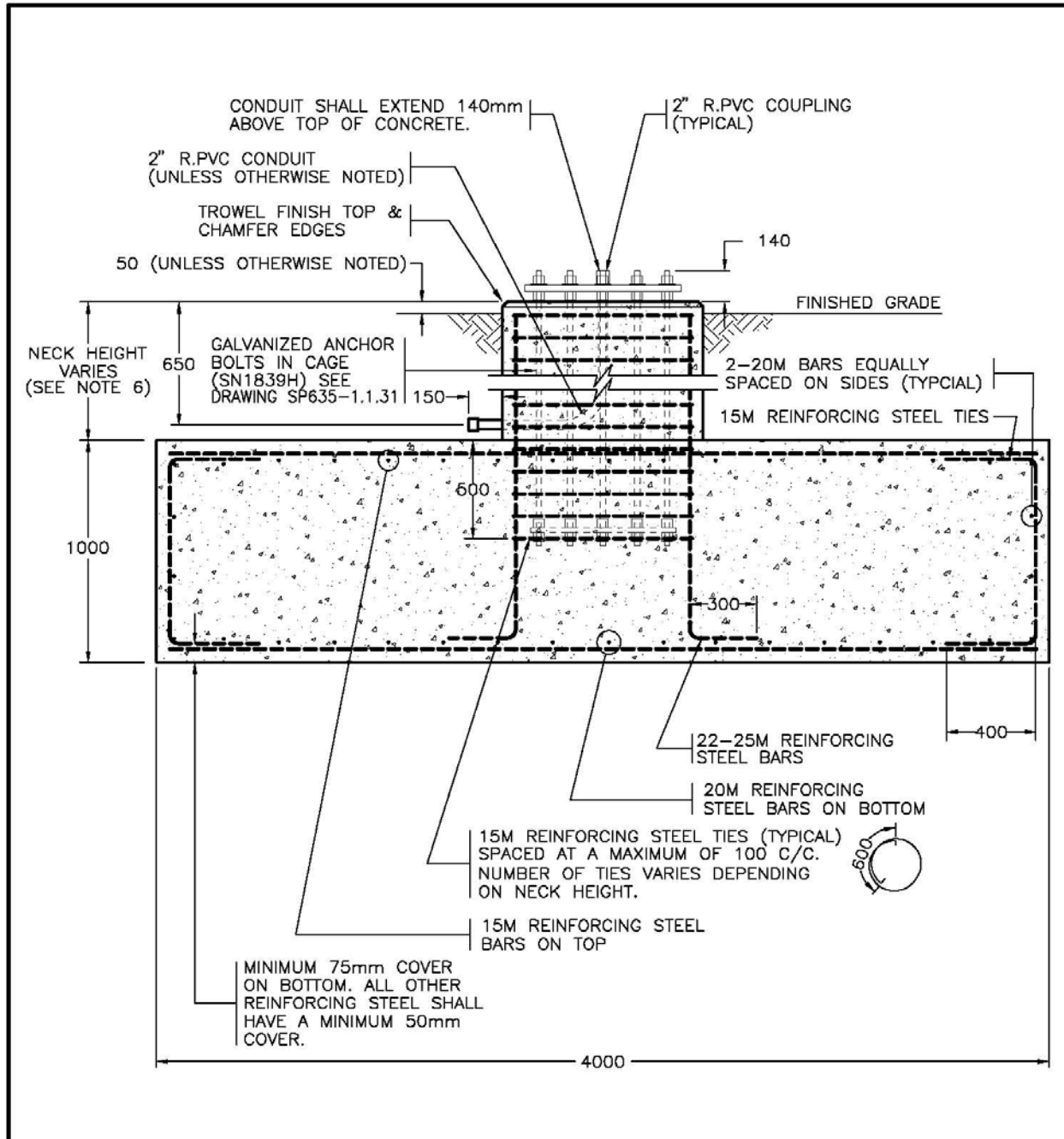
## GRADED AGGREGATE SEAL COAT (EPS)

**508.64 Stockpile Bases** - The stockpile base must be prepared prior to surveying and stockpiling. No payment will be made for stockpile base preparation work and no payment will be made for materials required for the preparation of stockpile bases.

**508.65 Claims for Vehicular Damage** - Without in any way limiting the Contractor's obligations or liabilities herein, during construction and up until final acceptance of the whole project by the Ministry Representative, the Contractor shall be fully responsible for all claims for damages caused by the work and shall address and deal with each claim submitted.

**508.66 Partial Payment for Rejected Work** – In the Ministry Representative's sole discretion and without setting precedence, where any work is reject but the Ministry Representative determines that it may be left in place, the Ministry Representative may authorize partial payment to the Contractor as full compensation for any residual value the work may have. Notwithstanding the foregoing, the Ministry is under no obligation to make any payment for reject work.





**SIDE VIEW**

SEE DRAWING SP635-1.1.26 FOR NOTES AND ADDITIONAL DETAILS

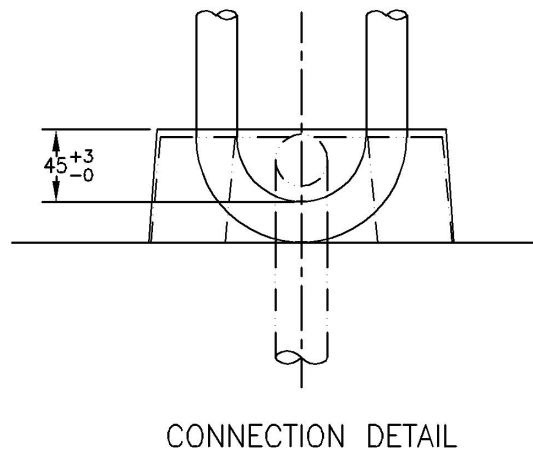
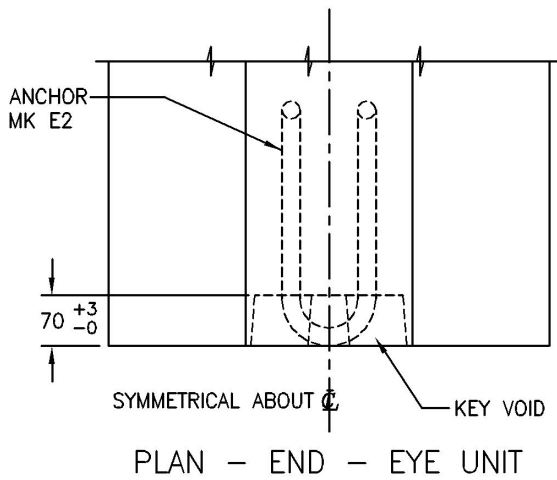
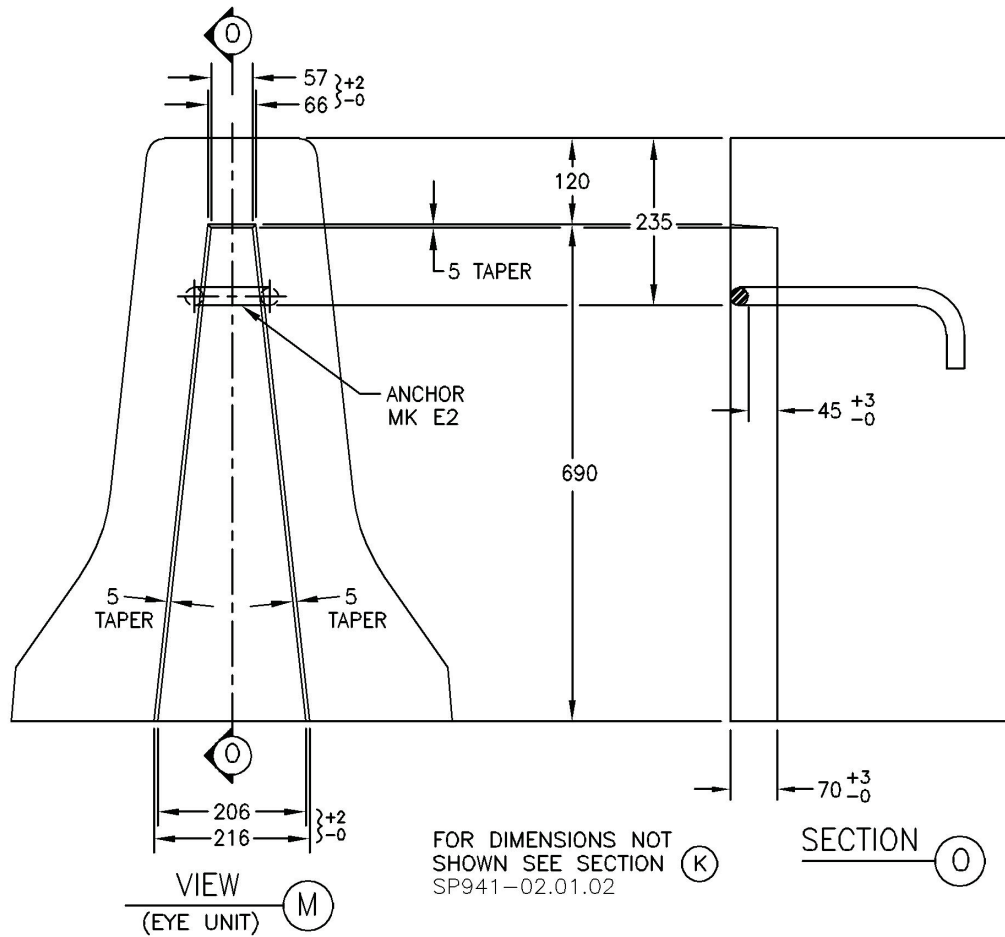


NOT TO SCALE

No.	Revision	Date	TYPE H1 CONCRETE SPREAD FOOTING (POURED IN PLACE)		SPECIFICATION DRAWING No.
F			Date	Approved	SP635-1.1.27
E			30/09/93	E.L. (Signature on File)	
D	BOTTOM REBAR REVISED	FEB 12	Chief Highway Engineer		
C	REBAR IN NECK & BASE ELEVATION REVISED	AUG 96			
B	NECK HEIGHT REVISED & REBAR ADDED	AUG 95			
A	GENERAL REVISIONS	AUG 94			

PRECAST CONCRETE MEDIAN BARRIER  
810 mm - CMB-E DETAILS

SP941-02.01.04



NOTES:

1. FOR LOCATION OF VIEW (M) SEE SP941-02.01.02.
2. FOR GENERAL NOTES SEE SP941-01.02.01.
3. FOR DETAILS OF ANCHORS SEE SP941-04.01.01.
4. THE CONNECTION DIMENSIONS PERMIT INSTALLATION TO A MINIMUM HORIZONTAL CURVE RADIUS OF 95.5 METRES.

NOT TO SCALE

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

TABLE 952-K REQUIREMENTS FOR HIGH FLOAT EMULSIFIED ASPHALTS

REQUIREMENT	GRADE													
	HF-100S		HF-150P/HF-100P		HF-150S		HF-250S		HF-350S		HF-500M		HF-1000M	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Residue by Distillation, % By Mass	62	---	64		62	---	62	---	65	---	65	---	65	---
Oil Distillate % By Volume	1	4	0.5	4	1	4	1	6	1.5	6	1	6	1	7
Saybolt Viscosity, Furol Seconds at 50°C	35	150	35	120	35	150	35	150	75	400	50	---	50	---
Sieve Test, % Retained on 1 mm Sieve	---	0.1	---	---	---	0.1	---	0.1	---	0.1	---	0.1	---	0.1
Coating Test %	90	---			90	---	90	---	---	---	---	---	---	---
Settlement 1 Day, % By Mass	---	1.5	---	---	---	1.5	---	1.5	---	1.5	---	1.5	---	1.5
Demulsibility: 50 mL 5.55 g/L CaCl <sub>2</sub> , % By Mass	75	---	75		75	---	---	---	---	---	---	---	---	---
Workability @ 10°C	---	---	---	---	---	---	---	---	---	---	---	---	Pass	---
<b>TEST ON RESIDUE</b>														
Penetration at 25°C, 100 g, 5 s	*		**		**		**		**		---	---	---	---
Viscosity at 60°C, Pa·s	*		**		**		**		**		8	20	2	8
Float Test at 60°C, s	1200	---	1200		1200	---	1200	---	1200	---	1200	---	1200	---
Solubility in Trichloroethylene, %	97.5	---			97.5	---	97.5	---	97.5	---	97.5	---	97.5	---

\* See Drawing SP952-02

\*\* See Drawing SP952-03 or Drawing SP952-05

Note For HF-150P, penetration tests shall be conducted on residue which has been distilled to 201° C ± 5° C