



Ministry of
Transportation
and Infrastructure

2018 Design Build Standard Specifications for Highway Construction

Errata No. 3

February 13, 2023

The following amendments apply to and take precedence over the 2018 Design Build Standard Specifications for Highway Construction, and over earlier Errata (if any).

This document is a consolidation of all DBSS 2018 Errata issued to date.

Amendments are presented in order of Section number, rather than release date. New amendments within this Update are flagged as **NEW**. Others have been previously released on the indicated "Issued" date heading each provision. Unless the context implies otherwise: **Bold Italicized** text is instructions; unitalicized text is the amended language; Redline/Strikeout formatting or grey-shading in table cells (when used) is only presented to aid users in identifying changes that have been made within a block of text. Not all changes are marked.

DBSS 202 Granular Surfacing, Base and Sub-Bases

[Errata No 1 - Issued 2020-09-01]

202.04.03 Secondary Quality Tests (Page 3 of 12) – Insert the following text between the end of DBSS 202.04.03(i) and the start of DBSS 202.05.02

- ii) If the aggregate fails any of the Sand Equivalent, Micro-Deval or Magnesium Sulphate tests, then the Contractor shall perform the Ministry's petrographic test (DBSS 202, Appendix 2) to determine the cause of failure. The Contractor's Quality Manager shall review the test results and, with the Ministry Representative will review the test results and determine whether the material is acceptable or not.

202.05 Aggregate Gradation – Gradation shall be determined in accordance with ASTM C136 and ASTM C117.

202.05.01 Aggregate shall have a gradation that defines a curve (% passing versus log sieve size) with a slope between adjacent sieves, equal or intermediate to the corresponding slopes of the boundary curves defined by the specification. Gradations shall fall within the limits, for the specified classification, shown in Table 202-C.

NEW [Errata No 3 - Issued 2023-02-13]

DBSS 202.21 Stockpiling (page 6 of 12) – Insert the following new clause.

202.21.07 Radial stackers may be utilized only under Contractor-developed written work and quality management procedures governing the stockpiling operation that ensures that:

- (a) the stockpile is large enough to accommodate all required material, or that separate stockpiles are developed;
- (b) segregation does not occur; and
- (c) lift thicknesses, drop heights, and wind-driven fines migration are minimized.

NEW [Errata No 3 - Issued 2023-02-13]

DBSS 202.36 Aggregates Supplied in Place (page 9 of 12) – Insert the following new clause.

202.36.04 Ministry Materials Processed on Private Lands – Where the Contractor elects to source raw materials from a Ministry pit or quarry, but process those materials on private lands:

- (a) The Contractor shall extract only as much raw material from the Ministry source as is necessary to produce the quantity of product required to be incorporated in the final Project, inclusive of staging and maintenance requirements, with a small additional contingency amount determined by the Contractor and the Quality Manager and approved by the Ministry Representative.
- (b) Ministry-sourced materials shall not be used in any way to improve the private lands, including without limitation for such purposes as access development, maintenance, or stockpile site preparation, unless approved in advance by the Ministry Representative under any conditions the Ministry Representative may require.
- (c) Any surplus raw or processed material remaining on the private lands at the end of construction shall:
 - (i) be returned by the Contractor to the Ministry source and stockpiled at a location determined by the Ministry Representative, all at the Contractor's expense; or
 - (ii) upon request by the Contractor and at the Ministry Representative's sole discretion, the Contractor may be offered the options of:
 - (A) of leaving the materials on the private land and providing a written agreement with the owner of the property which shall state that the Ministry will have free access to and exclusive use of the remaining materials for a period of twenty-four (24) months after the completion of the Contract, after which time the Ministry relinquishes all claims to the material; or
 - (B) purchasing the remaining material at a negotiated amount to be back-charged to the Contractor.
- (d) Where the volume of material remaining is less than the additional contingency amount determined pursuant to DBSS 202.36.04(a), the Ministry Representative will make the offers in DBSS 202.36.04(c)(ii). If agreement is not reached, DBSS 202.36.04(c)(i) will apply.

DBSS 421 Structural Steelwork

NEW [Errata No 3 - Issued 2023-02-13]

DBSS 421.06 Quality Assurance (page 3 of 21) paragraph 4, incorrectly references Table "421-1" rather than "421-A". Delete the fifth paragraph and replace it with the following:

The required test method and minimum extent of non-destructive testing will be per Table 421-A for each girder.

[Errata No 2 - Issued 2022-02-18]

Table 421-A NON-DESTRUCTIVE TESTING FOR GIRDERS: Delete the percentage values in last two rows of Table 421-A and replace them with the following.

Element	Test Method	Minimum Extent of NDT Testing
Other fillet welds	MT	<u>25%</u>
Upon removal of runoff tabs at the edge of a flange member	PT	<u>100%</u>

SECTION 502 – ASPHALT PAVEMENT CONSTRUCTION (EPS)

NEW [Errata No 3 - Issued 2023-02-13]

SS 502.08.03 Asphalt Mix Antistrip Additives (Page 6 of 28) – Delete DBSS 502.08.03 and replace it with the following:

“502.08.03 Asphalt Mix Anti-strip Additives

- (a) **All Mixes:** An anti-stripping agent, compatible with the supplied asphalt cement, shall be chosen by the Contractor from the Ministry’s Recognized Products List, and shall be added to all asphalt mix used in the Work. The Recognized Products List can be found online at:

<https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/recognized-products-list>

The Contractor shall notify the Ministry Representative of the type of anti-stripping agent and the percent by weight being added.

For all mix designs, the Contractor shall determine the Tensile Strength Ratio (TSR) of each asphalt mix in accordance with AASHTO T 283.

Asphalt cement must still meet the specified grade following the addition of the anti-stripping agent.

- (b) **Standard Dosage:** Organosilane anti-stripping agents are to be added at standard dosage rate of 0.05% additive by weight of asphalt cement. All other anti-stripping agents are to be added at a standard dosage rate of 0.3% additive by weight of asphalt cement.
- (c) **Increased Dosage:** The anti-stripping agent dosage rate shall be increased as necessary to meet a minimum TSR value of 80.
- (d) **Dosing Location:** The anti-stripping agent shall be added:
- (i) at the AC supplier’s terminal with the dosage rate percent included on the bill-of-lading; or
 - (ii) at the Contractor’s asphalt mix plant only after the Quantity Manager and the Ministry Representative have approved the process for blending the materials, conducting QC, and monitoring and confirming dosage rates.

NEW [Errata No 3 - Issued 2023-02-13]

SS 502.50 Payment Adjustment (page 12 of 28) is amended by adding the following after the existing text.

- (a) **Rejection Limits:** Notwithstanding any other provision of the Contract, including full or partial waivers of payments adjustments for any or all of the following five rated characteristics:
- (i) density;
 - (ii) AC content;
 - (iii) gradation;
 - (iv) application rate; and
 - (v) segregation.

the rejection limits for each of those characteristics will apply to the Work.

For smoothness, the payment adjustments and rejection limits shall apply as specified in DBSS 502.57 Smoothness.

NEW [Errata No 3 - Issued 2023-02-13]

SS 502.53.04 Payment Adjustments (AC Content, page 16 of 28) is amended by adding the following after the existing text.

However, if a Lot contains any Sub-Lot that falls within the reject zone of Table 502-F:

- (i) no bonus payment will be made for the Lot; and
- (ii) any penalty for the Lot will be based on the average AC content of all Sub-Lots, including those within the reject zone.

NEW [Errata No 3 - Issued 2023-02-13]

DBSS 502 Tables 502-F and 502-H (pages 16 and 18 of 28) are deleted and replaced with the following.

Table 502-F: Payment Adjustments for Deviation of Asphalt Content

Differences of Actual AC Content From Designed AC Content in JMF (AC in %)		
Deviation from Asphalt Mix Design JMF	Payment Adjustments \$ per tonne	
	Top Lift	Lower Lifts
-0.56 or less	REJECT	REJECT
-0.55 to -0.51	REJECT	-\$9.00
-0.50 to -0.46	-\$8.00	-\$8.00
-0.45 to -0.41	-\$7.00	-\$7.00
-0.40 to -0.36	-\$5.00	-\$5.00
-0.35 to -0.26	-\$3.00	-\$3.00
-0.25 to -0.16	-\$1.00	-\$1.00
-0.15 to -0.01	\$0.00	\$0.00
0.00 to +0.15	\$2.00	\$2.00
+0.16 to +0.30	\$1.50	\$1.50
+0.31 to +0.35	\$0.00	\$0.00
+0.36 to +0.40	-\$2.00	-\$2.00
+0.41 to +0.45	-\$3.00	-\$3.00
+0.46 to +0.50	-\$5.00	-\$5.00
+0.51 to +0.55	REJECT	-\$6.50
+0.56 or greater	REJECT	REJECT

Table 502-H: Payment Adjustments for Material Application Rate

Actual Application Rate (Percent of specified rate)	Payment Adjustments \$ per tonne of material in the Lot (unless otherwise note)	
	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		
≥ 103.0 to <105.0	-\$2.00	-\$2.00
≥ 102.0 to <103.0	\$0.00	\$0.00
≥ 97.0 to <102.0	\$1.00	\$1.00
≥ 94.0 to <97.0	-\$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	REJECT	REJECT

NEW [Errata No 3 - Issued 2023-02-13]

DBSS 502.57.04 Determination of Pavement Smoothness (page 19 of 28) is amended by deleting the third paragraph and replacing it with the following.

The profile shall be measured over the entire length of the pavement exclusive of structures and shoulder areas. Acceleration, deceleration and turning lanes are considered part of the driving lanes and shall be tested in accordance with this provision. The following areas will be excluded from Smoothness EPS payment adjustments and reject limits:

- Areas with a speed limit less than 70 km;
- Curb and gutter;
- Ramps, acceleration or deceleration lanes less than 300 m in length;
- Freeway cloverleafs;
- Turn lanes and storage lanes; and
- Other areas as specified in the Contract.

The areas outlined above are not exempt from the requirements of DBSS 502.57.09 Smoothness Deficiencies.

For the measuring process, the Contractor shall provide the Ministry Representative a chalk guideline in the centre of the lane immediately prior to measurement.

NEW [Errata No 3 - Issued 2023-02-13]

DBSS 502 Appendix 2 (Page 25 of 28): The first sentence of the first paragraph is amended to insert language as shown below.

1. Three (3) samples per Sub-Lot shall be obtained by the Contractor, accordance with ASTM D979 and DBSS 502 Appendix 502-2-1, at locations and times chosen by the Quality Manager or the Ministry. The first sample shall be used by the Contractor for Quality Control, the second sample by the Quality Manager for Quality Assurance, with the third retained by the Quality Manager and the Ministry for potential appeal testing.

DBSS 502 Appendix 2-1: Insert the attached new DBSS 502 Appendix 2-1 immediately after DBSS 502 Appendix 2.

SECTION 635 – ELECTRICAL AND SIGNING

NEW [Errata No 3 - Issued 2023-02-13]

DBSS 635 – The following four SP Drawings are deleted and replaced with the attached revised versions. Note that the Apr 2020 revision noted on the attached SP Drawings was not issued separately, but all cumulative changes have been reflected within the new revised Drawings.

- ***DBSS Drawing SP635—2.1.1 (Page 91 of 276) – New Revision G.***
- ***DBSS Drawing SP635—2.3.9 (Page 125 of 276) – New Revision G.***
- ***DBSS Drawing SP635—2.5.6 (Page 157 of 276) – New Revision F.***
- ***DBSS Drawing SP635—2.5.10 (Page 161 of 276) – New Revision C.***

SECTION 757 – REVEGETATION SEEDING**NEW** [Errata No 3 - Issued 2023-02-13]

DBSS 757.02 References and DBSS 757.12.03 (Page 1 of 8)– Replace references to “Canada Seeds Act” with “Canada Seeds Act and Regulations”.

SECTION 942 – PRECAST CONCRETE INTERLOCKING MODULAR BLOCKS**NEW** [Errata No 3 - Issued 2023-02-13]

DBSS 942 Precast Concrete Interlocking Modular Blocks– Add **NEW** Section, attached.

SECTION 952 – CONTRACTOR SUPPLY ASPHALT AND PAVING MATERIALS FOR HIGHWAY USE**NEW** [Errata No 3 - Issued 2023-02-13]

DBSS 952 Table 952-A Standard Test Methods – ASTM (Page 2 of 15) – Test Methods D2415 and D6084 are added. Delete the Table and replace with the following amended version.

Table 952-A: Standard Test Methods - ASTM

ASTM TEST DESIGNATION	TITLE OF TEST: Standard Test Method for...
D5	Penetration of Bituminous Materials
D13	Ductility of Asphalt Materials
D36	Softening Point of Bitumen (Ring-and-Ball Apparatus)
D70	Density of Semi-Solid Asphalt Binder (Pycnometer Method)
D92	Flash and Fire Points by Cleveland Open Cup Tester
D95	Water in Petroleum Products and Bituminous Materials by Distillation
D113	Ductility of Asphalt Materials
D139	Float Test for Bituminous Materials
D243	Residue of Specified Penetration
D244	Standard Test Methods and Practices for Emulsified Asphalts

D402	Distillation of Cutback Asphalt
D803	Testing Tall Oil
D1310	Flash Point and Fire Point of Liquids by Tag Open-Cup Apparatus
D1754	Effects of Heat and Air on Asphaltic Materials (Thin-Film Oven Test)
D2042	Solubility of Asphalt Materials in Trichloroethylene
D2170	Kinematic Viscosity of Asphalts
D2171	Viscosity of Asphalts by Vacuum Capillary Viscometer
<u>D2415</u>	<u>Ash in Coal Tar and Pitch</u>
<u>D6084</u>	<u>Elastic Recovery of Bituminous Materials by Durometer</u>
D7496	Viscosity of Emulsified Asphalt by Saybolt Furol Viscometer

NEW [Errata No 3 - Issued 2023-02-13]

DBSS 952 Table 952-C-2 Performance Grades of Asphalt Cement (page 4 of 15) – At three locations within the Table, the symbol “δ” was incorrectly rendered as “□”. Delete Table 952C2 and replace it with the following.

TABLE 952-C-2: PERFORMANCE GRADES OF ASPHALT CEMENT

PERFORMANCE GRADE ASPHALT CEMENT	PG 64-YY	PG 58-YY	PG 52-YY	AASHTO TEST METHOD
Min Low Temperature PG-YY	-22	-28	-34	M 320, Table 1
Requirements for Minimum Pavement Design Temperature °C PG-YY may be as specified in Special Provisions				R 29
Solubility in TCE min. %wt.	99.0	99.0	99.0	T 44
Flash, min. °C	230	230	230	T 48
DSRo, $ G^* /\sin \delta$, min, kPa @ T°C	1.00 @ 64	1.00 @ 58	1.00 @ 52	T 315
Mass Change RTFOT, max ± %wt.	1.00	1.00	1.00	T 240
DSRr, $ G^* /\sin \delta$, min, kPa @ T°C	2.20 @ 64	2.20 @ 58	2.20 @ 52	T 315
DSRp, $ G^* /\sin \delta$, max, kPa @ T°C	5000 @ 25	5000 @ 19	5000 @ 13	T 315
BBR, m-value, min, @ T°C	0.300 @ -12	0.300 @ -18	0.300 @ -24	T 313
BBR, S, max, MPa @ T°C	300 @ 12	300 @ -18	300 @ -24	T 313
Dynamic Viscosity, max, Pa·s	3.00	3.00	3.00	T 316

NEW [Errata No 3 - Issued 2023-02-13]

DBSS 952 TABLE 952-K: REQUIREMENTS FOR HIGH FLOAT EMULSIFIED ASPHALTS (Page 7 of 15) – Two new products and two new tests have been added. Delete the existing Table and replace with the attached amended Table 952-K, provided for convenience on a new sheet (Page 7a of 15).

Note the attachment only includes Table 952-K. Table 952-J remains in effect, unchanged.

ATTACHMENTS:

- NEW** Issued February 13, 2023: DBSS 502 Appendix 2-1 – 7 pages
- NEW** Issued February 13, 2023: DBSS 635 Drawings SP635-2.1.1, 2.3.9, 2.5.6 and 2.5.10 - 4 pages
- NEW** Issued February 13, 2023: DBSS 942 – 3 pages
- NEW** Issued February 13, 2023: DBSS 952 Table 952-K – 1 page

End of DBSS 2018 Errata No. 3

DBSS 502 APPENDIX 2-1

LOOSE ASPHALT MIX SAMPLING PROCEDURE

1.0 General:

The purpose of this document is to establish a standard procedure for sampling loose mix asphalt used for the Ministry's projects. The intent is to obtain a representative loose mix asphalt sample before the material is compacted and incorporated into the pavement.

Three methods are outlined as follows. Users can select a method that is best suitable for their operations and can obtain a representative loose asphalt mix sample based on the individual project conditions.

Method A (sampling using shovel – no plate) – In this method a loose mix sample is obtained from the asphalt concrete mat behind the paver using a shovel. The sample is obtained before the start of compaction.

Method B (sampling using sampling plate) – This method uses a sampling plate that is placed on the roadway prior to placement of asphalt mix from the paver. This method is suitable when the asphalt mix is placed on a base course surface to avoid sample contamination with underlying base material. This method is also suitable when asphalt mix is placed on a milled surface to avoid loss of fines while obtaining the sample.

Method C (sampling using sampling template) – This method uses a sampling template that is placed on the roadway prior to compaction. The template is inserted through the depth of the asphalt mat.

2.0 General Training/Experience:

All samples shall be obtained by a person experienced with procedures for sampling and handling asphalt mix. This person shall have adequate knowledge and training related to safety practices to be followed on a paving project.

3.0 Apparatus/Equipment:**a. Equipment Common to All Methods**

- Measuring tape
- Insulated gloves
- Flat nose shovel with vertical sides (Recommended: 10" x 12" with 2.5" sides, overall length 5'). Users can choose a shovel size suitable for their operations.

- Sample container – Cardboard boxes, metal containers, stainless steel bowls or other suitable containers

b. Additional Equipment Needed**Method A**

- No additional equipment needed.

Method B

- Shovel - Regular shovel can be used as well for this method.
- Sampling plate - heavy gauge metal plate preferably 380 mm x 380 mm (15" x 15") or 360 mm x 720 mm (14" x 28"), minimum 8 gauge thick optional wire attached to one corner long enough to reach from the center of the paver to the outside of the farthest auger extension. Holes 6.4 mm (¼") diameter should be provided in each corner. The plate should be capable of safely holding 15 to-30 kg material.
- Flat tray with handles (can be used instead of plates)

Method C

- Shovel - Regular shovel can be used as well for this method.
- Sampling template – Formed steel box (cookie cutter) with two 100 mm x 150 mm x 9 mm handles, sized to accommodate sample requirements. The leading edge of the cookie cutter box can be slightly beveled or angled for easier insertion into the asphalt mat.

4.0 Sampling Procedure:**a. Method A - Sampling Using Shovel (No Plate):**

1. Select a random location that is representative of the cross section of the mat as per the practices followed by the Ministry.
2. Mark the roadway with suitable marker. Wait until the paver has passed the mark.
3. For a standard 3.65m wide mat, samples shall be taken 0.3 to 1.0m from outside edge of the pavement.
4. Sampling shovel can be preheated prior to taking the sample. Make sure that the shovel is free of any material, contaminant or solvent (release agent etc.).
5. Using the flat nose sampling shovel at the random location, dig directly downward into

newly placed asphalt mat until it comes into contact with the pavement or other surface below.

6. When in contact, push the shovel forward until sampling shovel is full of asphalt mix and lift the shovel up slowly, being careful not to lose any asphalt mix. Place materials from shovel directly into sample container.
 7. Scrape any asphalt mix material adhering to the shovel into the sampling container using a spatula. Extreme care should be taken to minimize coarse and fine particle separation while the sample is being taken.
 8. The asphalt mix sample shall be obtained from the full depth of the mat avoiding contamination from underlying layers.
 9. Try not to disturb any more sampling area than necessary to obtain a representative sample.
 10. Take sufficient asphalt mix material to complete all the testing requirements specified as per the contract.
 11. The material removed from the roadway shall be immediately replaced. The material shall not be broadcasted across the asphalt mat.
- b. Method B - Sampling Using Metal Plate:**
1. Select a random location that is representative of the cross section of the mat to be constructed, as per the practices followed by the Ministry.
 2. The plate should be placed at least 600mm away from the edge of the asphalt mat. Determine the location of the plate before the paver reaches the selected location.
 3. Lay the plate (with attached wire if used) down diagonally with the direction of travel, keeping it flat and tight to the base with the lead corner facing the paving machine.
 4. If multiple plates are used (usually 3), the plates should be staggered over the lane, in the transverse direction (two plates at 300 mm from the edges of the lane and one at the center of the lane).
 5. If wire is used with the plate, run the attached wire perpendicular to the direction of the paver, beyond the farthest auger extension and beyond the paving width. The wire should be held to the ground to allow construction and paving equipment to pass over the wire and the plate.
 6. Make sure that the plate is placed in a manner or is secured properly so that it doesn't get dragged or lifted during placement of asphalt mix. This is important as the plate can potentially cause screed or other equipment damage when not secured or placed properly.

7. High temperature heat resistant metallic tape may be used to hold the plate securely (in case plate is getting dragged or lifted). The wire can be held to the surface or secured using tape.
8. After the placement of asphalt mix, locate the plate. If wire attachment is used, locate the plate by raising the wire.
9. Raise the plate slightly using a shovel, taking care not to lose any of the asphalt mix from the plate. This will locate four corners of the plate.
10. Using the flat nose sampling shovel, dig directly downward into newly placed asphalt mat until it comes into contact with the plate below.
11. When in contact, push the shovel forward until sampling shovel is full of asphalt mix and lift the shovel up slowly, being careful not to lose any asphalt mix. Place materials from shovel directly into sample container.
12. Scrape any asphalt mix material adhering to the plate and shovel into the sampling container using a spatula. Extreme care should be taken to minimize coarse and fine particle separation while the sample is being taken.
13. If flat tray with handles is used instead of plates, lift the flat tray using sampling shovel to locate corners of the tray. Flat tray should be secured to the surface prior to placement of mix as described above.
14. Vertically lift the tray laden with asphalt mix from the HMA mat by being careful not to disturb the mix at the edge of the tray. Place the entire asphalt mix sample in the container. Scrape any asphalt mix material adhering to the tray into the sampling container using a spatula.
15. The material removed from the roadway shall be immediately replaced. The material shall not be broadcasted across the asphalt mat.

c. Method C - Sampling Using Template ("Cookie Cutter"):

1. Select a random location that is representative of the cross section of the mat to be constructed, as per the practices followed by the Ministry.
2. Mark the roadway with a suitable marker. Wait until the paver has passed the mark.
3. Once the paver has passed the sampling location, immediately place the template on the location to be sampled. Push the template through the asphalt mat until it touches the underlying surface.

4. Using a shovel/scoop, carefully remove all the asphalt mix from inside the template and place into the sampling container.
5. The template shall be scraped as clean as possible to include the fines in the sample.
6. A plate can be used similar to Method B above if contamination of asphalt mix sample from underlying base or loss of fines on a milled surface is a concern.
7. If sampling plate is used, make sure that the template is smaller than the plate and can be easily accommodated inside the sampling plate (example 330mm template dimension for a 380mm sampling plate).
8. Scrape any asphalt mix material adhering to the template into the sampling container using a spatula. Extreme care should be taken to minimize coarse and fine particle separation while the sample is being taken.
9. The material removed from the roadway shall be immediately replaced. The material shall not be broadcasted across the asphalt mat.

5.0 Filling Sampling Holes:

- The holes shall be filled with sufficient quantity of asphalt (preferably slightly overfilled) so that satisfactory restoration of final surface can be achieved.
- When backfilling, the asphalt mix should be dumped vertically. Horizontal dumping of asphalt mix can result in segregation on the asphalt mat.

6.0 Sample Identification / Labelling:

- Follow regular Ministry procedures for sample identification and labeling.

7.0 Safety:

Safety precautions are required when sampling and handling asphalt materials. Following are the general safety precautions to be observed when sampling. This procedure may not address all the safety concerns and additional safety measures may be necessary for individual projects or locations.

- Assessing hazards with associated work.
- Determining and using appropriate hazard mitigation strategies, to remove or eliminate hazards and prevent worker exposure.
- Taking precautions to avoid personal injury and environmental hazards.
- Taking precautions to prevent direct contact with high temperature materials.

- Using available resources for any emergencies.
- For safety, the roller(s) must remain at least 3 m (10 ft.) behind the sampling operation until the sample has been obtained and the hole filled with loose asphalt mixture.
- The plate placing operation must be at least 3 m (10 ft.) in front of the paver or pickup device. The technician placing the plate must have eye contact /communication with the paving machine operator. If eye contact cannot be maintained at all times, a third person must be present to provide communication between the operator and the technician.
- Specific precautions as required for each individual project and site.

8.0 References:

- ASTM D979
- AASHTO T 168
- Elseifi, M., Evaluation of Hot Mix Asphalt Sampling Techniques (2007)
- Iowa DoT Hot Mix Sampling Demo (2019) [Source of the photos on the following pages.]

Recommended Sampling Shovel**Method A: Sampling Using Shovel Only**

A1: Digging Shovel directly into asphalt at selected location.



A2: Lifting shovel full of asphalt mix.



A3: Scraping off leftover asphalt mix/fines from the shovel into sample container.

Method B: Sampling Using Sampling Plate and Shovel



B1 – Placing sampling plates on the existing surface.



B2 - Plates prior to placement of asphalt mix by paver.



B3 - Locating sampling plate with attached wire after asphalt mix is placed.



B4 - Lifting sampling plate with shovel.



B5 - Taking mix sample on top of the sampling plate.



B6 - Filling the hole left behind by vertically dumping new asphalt mix.



B7 - Sampling hole filled up with new asphalt mix.



B8 - Sampling location after placement of new mix and compaction.

Method C: Sampling Using Sampling Template (Cookie Cutter)



C1 - Example: Sampling templates and scoop.



C2 - Placing sampling template at selected location on newly placed asphalt mat.



C3 - Placing sampling template at selected location on newly placed asphalt mat.



C4 - Removing asphalt mix inside the sampling template using scoop.



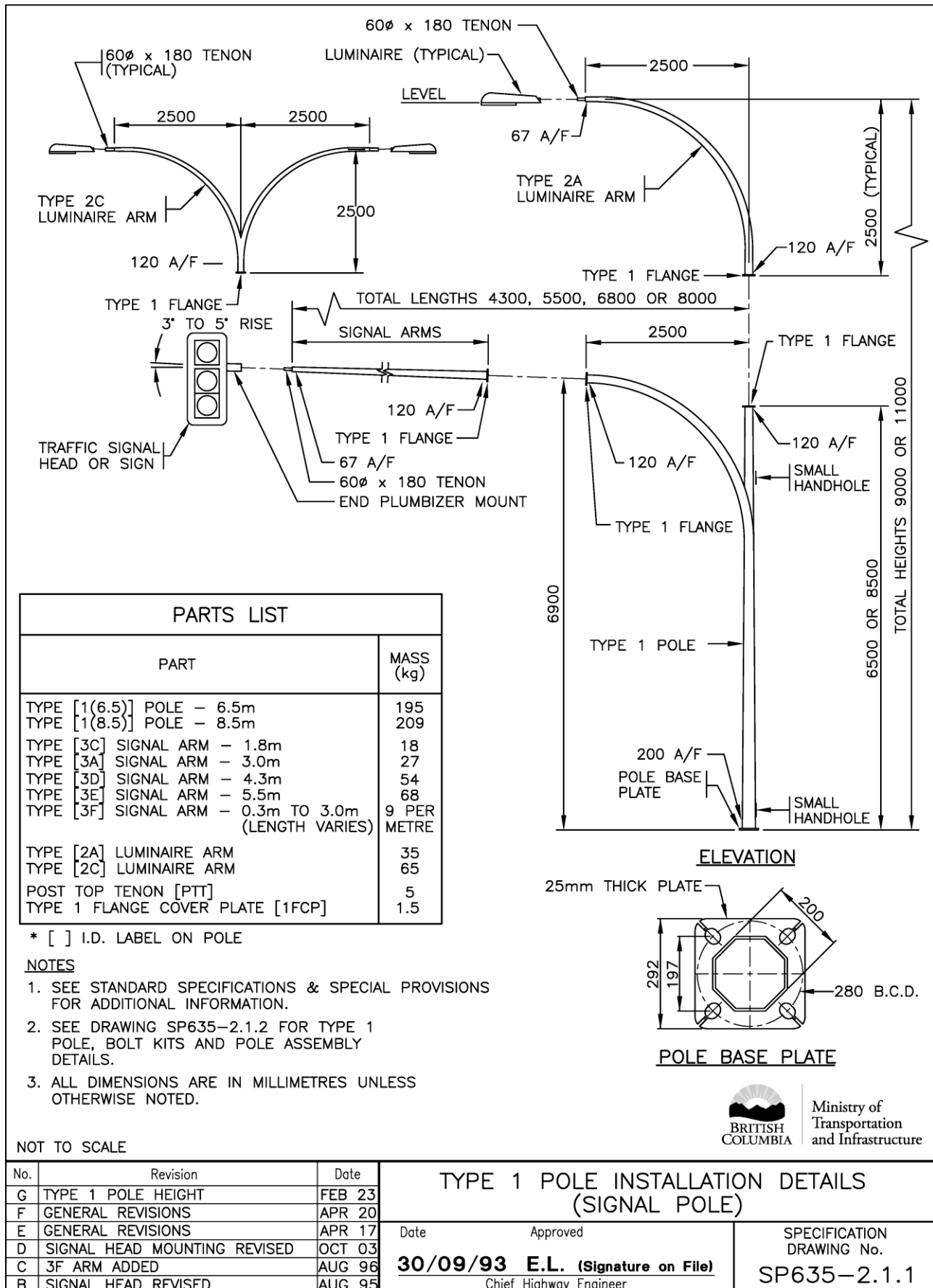
C5 - Scraping off leftover asphalt mix/fines from the scoop into sample container.

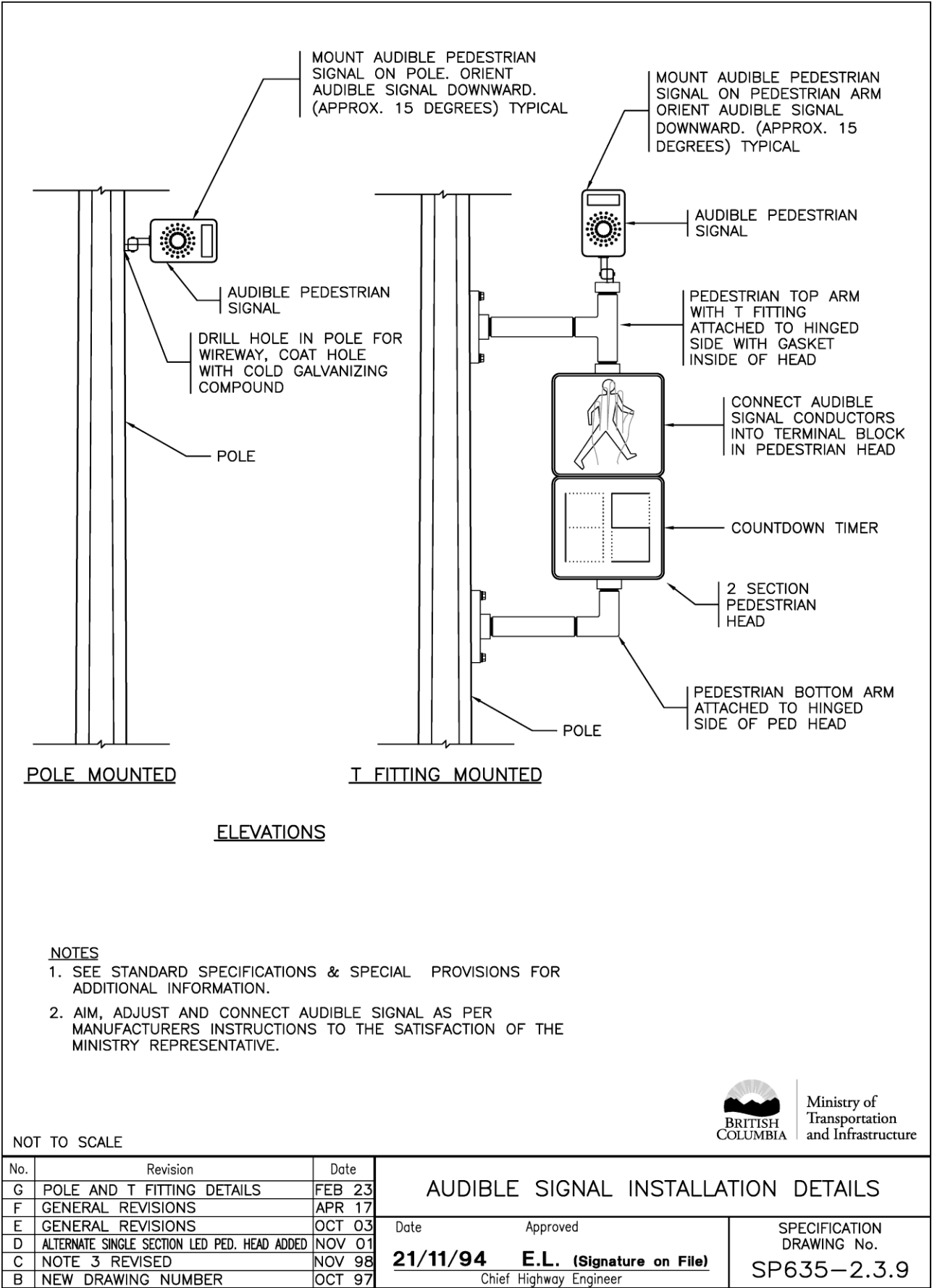


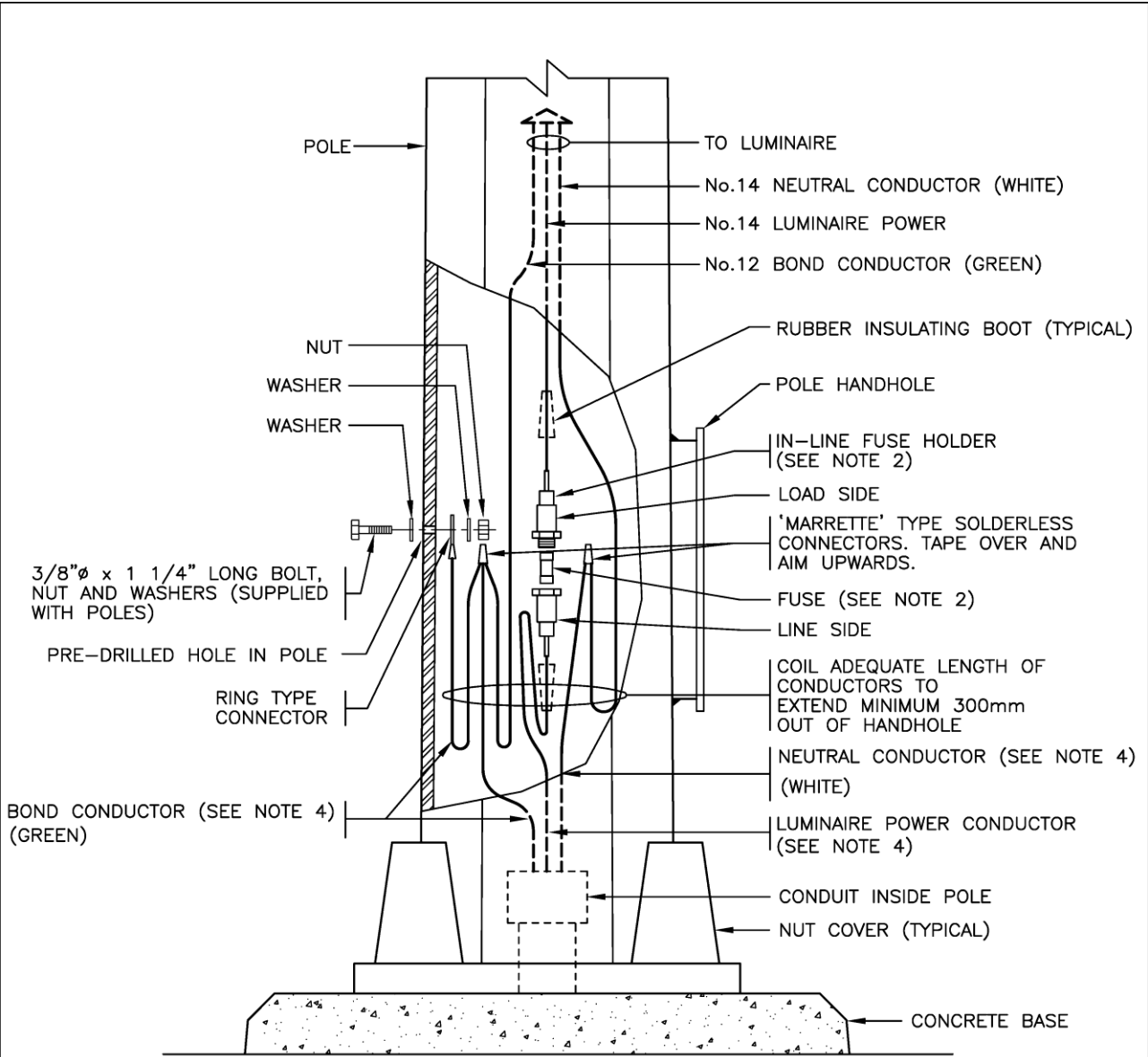
C6 - Scraping off leftover asphalt mix/fines from the template into sample container.



C7 - For bigger sampling template shovel can be used.







ELEVATION

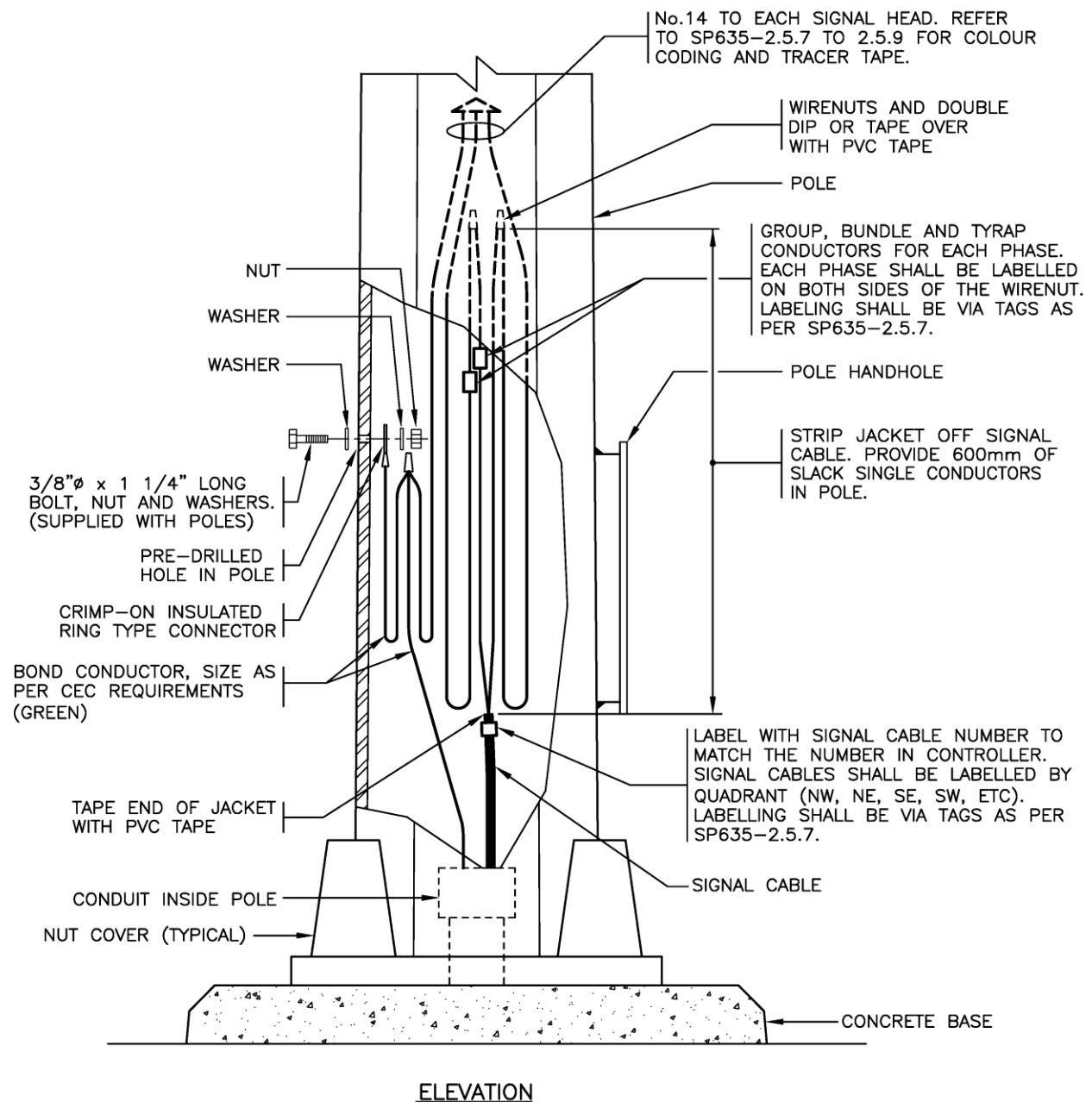
NOTES

- 1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
- 2. IN-LINE FUSE HOLDER SHALL BE A TRON HEB-AA WEATHERPROOF FUSE HOLDER OR A GOULD SHAWMUT GEB-11-11 C/W 5A GOULD SHAWMUT ATM OR BUSS KTK FUSE (347V) OR A 10A GOULD SHAWMUT OTM OR BUSS BAN-10 FUSE (120V) AND 2 'L' TYPE INSULATING BOOTS.
- 3. FUSE INSTALLATION IN JUNCTION BOXES SIMILAR.
- 4. SIZE AS PER CEC REQUIREMENTS.

NOT TO SCALE



Revision			LUMINAIRE WIRING IN POLE HANDHOLE		
No.	Revision	Date			
F	NOTE 4 ADDED	JUN 22			
E	GENERAL REVISIONS	APR 20			
D	GENERAL REVISIONS	APR 17			
C	FUSEHOLDER TYPE REVISED	AUG 99			
B	NOTES REVISED	AUG 95			
A	GENERAL REVISIONS	AUG 94			
			Date	Approved	SPECIFICATION DRAWING No.
			30/09/93	E.L. (Signature on File)	SP635-2.5.6
			Chief Highway Engineer		



NOTES

1. SEE STANDARD SPECIFICATIONS & SPECIAL PROVISIONS FOR ADDITIONAL INFORMATION.
2. REFER TO SP635-2.5.7 FOR CONDUCTOR LABELING.

NOT TO SCALE



Ministry of
Transportation
and Infrastructure

No.	Revision	Date	SIGNAL CABLE WIRING IN POLE HANDHOLE		
F					
E					
D					
C	BOND CONDUCTOR REVISED	JUN 22	Date	Approved	SPECIFICATION
B	GENERAL REVISIONS	APR 20	14/11/03	D.N. (Signature on File)	DRAWING No.
A	GENERAL REVISIONS	APR 17	Chief Engineer		SP635-2.5.10

SECTION 942

PRECAST CONCRETE INTERLOCKING MODULAR BLOCKS

942.01 Scope – This Section covers the quality and manufacture of precast concrete interlocking modular blocks (Interlocking Blocks) made using wet-cast concrete supplied for Ministry use.

This standard specification covers only Interlocking Blocks that have the following nominal dimensions:

- Full-sized blocks: 750 mm height x 750 mm depth x 1500 mm long.
- Half sized blocks: 750 mm height x 750 mm depth x 750 mm long.
- Compatible corner blocks and other partial sized or special purpose blocks for use with the full-sized blocks

Requirements for other block sizes, types and proprietary systems will be specified in the Contract.

Interlocking Blocks shall be supplied in the sizes and types as required by purchase order or Contract/Drawing requirements, and shall comply with this Section unless otherwise specified by the Contract or Purchase Order.

942.02 Definition of Precast Concrete Interlocking Modular Blocks (“Interlocking Blocks”) – Precast monolithic concrete blocks with interlocking shear keys of specified dimensions made from wet-cast concrete for use in the construction of an engineered gravity retaining wall or an engineered mechanically stabilized earth (MSE) wall.

MATERIALS

942.10 Provision of Interlocking Blocks – Interlocking Blocks shall be manufactured to comply with the design of a proprietary product listed on the Ministry’s [Recognized Products List](#) (RPL).

The Recognized Product List is available on-line at:

<https://www2.gov.bc.ca/gov/content/transportation/transportation-infrastructure/engineering-standards-guidelines/recognized-products-list>

942.11 Details of Interlocking Blocks – All block edges, except the shear key and corresponding socket, shall have a 40 ± 20 mm chamfer.

Dimension tolerances shall be ± 15 mm.

All Interlocking Blocks require the following identification information to be cast into the end of each block, in a manner, size and depth to be permanently legible:

- manufacturer’s name or trademark,

- date of manufacture, and
- form number.

942.12 Shear Keys – Interlocking Blocks shall have engineered interlocking shear keys with no more than 12 mm of design clearance around the shear key. The shear keys shall be cast integrally with the block and shall provide shear strength across the interface between courses of the Interlocking Blocks.

The shear key shall be designed to allow interlocking

- in a linear installation in running bond and stack bond layouts, and
- at ninety degrees (90°) corners

The interface shear strength between the courses of Interlocking Blocks and the shear key strength shall be adequate to resist earth pressure forces of ten metres (10 m) in height. Engineered documentation and test results that demonstrate the interface shear strength and shear key strength shall be submitted to the Ministry Representative for compliance review upon request.

Bench style and wall top course Interlocking Blocks shall have a flat top surface (i.e. without shear keys) with recessed galvanized lifting loops.

942.13 Lifting Loop Strands – Interlocking Blocks shall have galvanized steel lifting loops engineered by a professional engineer registered with the Association of Professional Engineers and Geoscientists of BC, and be designed so that the block can be lifted and positioned using only a standard hook or clevis.

Lifting loops shall be fabricated from 12.5 mm or 16 mm nominal diameter 7-wire zinc coated steel wire strand. Zinc coated 7-wire strand shall be in accordance with ASTM A475 or CSA G12 Class A zinc coating.

Lifting loops shall be anchored and embedded sufficiently into the block to safely enable lifting and handling of the blocks.

Lift points shall be designed and installed directly above the centre of mass of the block and in a manner that will allow them to remain in place and not interfere with full concrete-on-concrete bearing when blocks are stacked on top of each other.

Installation shall not require the lift points to be removed.

942.14 Concrete Quality

All concrete material and work shall be in accordance with SS 211 except as modified by this SS 942.

Material shall be new or virgin and contain no Recycled Concrete Aggregate Material (RCAM).

Concrete shall meet the requirements of Table 942-A.

Table 942-A: Concrete Mix Requirements

Property	Requirement
Minimum 28 day compressive strength	32 MPa
Air Content	5% to 7%
Nominal Maximum Size of Coarse Aggregate	28 mm
Maximum Plasticized Slump	80 ± 20 mm
Maximum water/cementitious materials ratio by weight	0.40
Minimum cement content	320 kg/m ³

942.15 Finished Surface of Concrete – Concrete for Interlocking Blocks shall be poured monolithically, with no cold joints. (i.e. continuously poured until the concrete is level with the top edge of the form.)

All surfaces shall have a smooth finish conforming to CSA A23.4 Section 26.2.3 “Standard Grade” with a uniform finish. There shall be no pronounced texture and fins shall be removed. There shall be no open pockets or distortions in excess of 12 mm.

Project-specific architectural finishes or types of the exposed face shall be as specified in the Contract and the Design.

Consistency of the concrete finish for the Interlocking Blocks for the project shall be maintained by using the same concrete mix and the same type of form oil.

Interlocking Blocks shall be sound and free of cracks or other defects that interfere with the proper placement of the block. Interlocking Blocks having cracks or spalling that are continuous through any solid element of the block shall be rejected regardless of the width or length.

All sharp or protruding surfaces of the Interlocking Blocks by careful rubbing or grinding.

942.15.01 Defects – Structurally defective or damaged Interlocking Blocks, as well as those with defects outside the limits specified in SS 942.15.01(a) shall be cause for rejection.

(a) Repair of Limited Defects – Subject to the approval of the Quality Manager and the Ministry Representative, non-structural defects, within the limits identified below, may be repaired:

- Surface defects where their total area is not in excess of 2% of the exposed surface area of the unit.
- Open pockets not greater than 6 mm in diameter and not more in number than twenty (20) in any 300 mm x 300 mm area.

(b) Repair Products – Approved repairs shall be done using approved patching materials from the [Recognized Products List](#) for patching of isolated small holes, cavities and similar self-confining defects of the Interlocking Blocks in order to restore the durability of the block.

The patching material shall provide a reasonable colour match to the cured dry Interlocking Block, be well tooled in, be finished flush and smooth, and cured adequately, using water or a curing compound.

942.16 MSE Walls – All connections between the MSE wall soil reinforcement elements and the Interlocking Blocks shall be in accordance with the Ministry’s Supplement to CSA S6, and the design shall be prepared by a professional engineer registered with the Association of Professional Engineers and Geoscientists of BC.

Modifications to the Interlocking Blocks for the soil reinforcement connections shall comply with the engineered connection design details.

942.17 Quality Control Requirements for Interlocking Blocks – The manufacturer of the Interlocking Blocks shall have a Quality Control Plan in place in order to ensure and document compliance with the Contract requirements. This plan shall be submitted to the Contractor and the Ministry Representative for compliance review upon request.

Manufacturers failing to meet the Contract requirements shall take immediate remedial steps to become compliant.

In addition to the quality control requirements of DBSS 211, the Contractor shall extract a set of two 100 mm diameter by 200 mm long cores from one block prior to delivery to the Site.

The cores shall be taken in the middle of the block along the back face so that the block may still be used if specifications are met. The cored holes shall be patched and cured using approved materials from the [Recognized Products List](#).

For projects with more than 50 blocks, a minimum of one set of cores shall be extracted for every full or partial lot of 50 blocks supplied.

The Contractor shall ensure that the core test results are traceable to every other block cast from the same concrete batch and every other block in the 50-block lot. Only Blocks with traceable testing documentation will be accepted for use.

One of these cores will be tested for the compressive strength in accordance with CSA A23.2-14C and CSA A23.2-9C.

The second core shall be tested for air void analysis in accordance with ASTM C457.

The evaluation of the results from the testing of the cores shall be in accordance with CSA A23.1.

The Ministry may reject the whole lot of blocks represented by the initial or subsequent core testing if the core tests fail to meet the Contract Specifications.

942.18 Quality Assurance of Interlocking Blocks – The Contractor and/or the Ministry Representative may elect to carry out Quality Assurance of the manufacturer's fabrication facility and processes and/or the Interlocking Blocks.

The manufacturer's facility and the Interlocking Blocks shall be accessible to the Contractor and/or Ministry Representative for inspection, testing, quality assurance and quality audit purposes at all times during manufacturing and shipping of Interlocking Blocks.

All testing, material, and Quality Control records shall be made available to the Contractor and/or Ministry Representative upon request.

The Contractor shall notify the Ministry Representative a minimum of fourteen (14) days in advance of the date the Interlocking Blocks are to proposed to be shipped to allow the Ministry Representative an opportunity to inspect the Interlocking Blocks before delivery.

Patching and/or repair of defects may be inspected before shipment, or upon delivery, and the rejected unit(s) shall be replaced at no cost to the Ministry.

The Ministry Representative reserves the right to conduct any Quality Assurance testing deemed necessary to confirm Interlocking Blocks comply with the specifications before Interlocking Blocks are accepted for final payment.

The Ministry Representative reserves the right to reject any or all Interlocking Blocks based on visual and non-destructive methods.

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	---	<u>62</u>	---	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 Furol Viscosity, @ 50°C, Furol seconds	35	150	35	<u>150</u>	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 ₂ , % By Mass	75	---	75	---	75	---	---	---	---	---	---	---	---	---
Workability @ 10°C	---	---	---	---	---	---	---	---	---	---	---	---	Pass	---
TESTS ON RESIDUE														
Penetration at 25°C, 100 g, 5 s	*	*	**	**	**	**	**	**	**	**	---	---	---	---
Viscosity at 60°C, Pa·s											8	20	2	8
Float Test at 60°C, s	120 0	---	120 0	---	120 0	---	120 0	---	120 0	---	120 0	---	120 0	---
Solubility in Trichloroethylene, %	97.5	---			97.5	---	97.5	---	97.5	---	97.5	---	97.5	---
<u>Ash Content, % by weight</u>				<u>1.0</u>										
<u>Elastic Recovery, % at 10°C</u>			<u>50</u>											

* See DBSS Drawing SP952-02

** See DBSS 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