

PART 1 - GENERAL

<u>1.1 Related Sections</u>	.1	Section 01 33 00 - Submittal Procedures
	.2	Section 01 35 43 - Environmental Procedures
	.3	Section 01 74 21 - Construction/Demolition Waste Management and Disposal
	.4	Section 31 01 16 - Removal of Existing Asphalt
	.5	Section 32 16 15 - Concrete Walks, Curbs and Gutters
	.6	Section 35 05 14 - Catchbasins
<u>1.2 Description of Work</u>	.1	This work consists of excavating materials within contract limits. Included would be the hauling and placement of suitable material within the contract limits, the hauling and stockpiling (on site) of surplus material for future use and the hauling and disposal of excess and unsuitable material.
<u>1.3 Definitions</u>	.1	Excavation classes: one class of excavation will be recognized, common excavation. .1 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation. Materials included under excavation are, but not limited to, topsoil, concrete sidewalk, concrete curb and gutter, and miscellaneous existing fill materials such as gravel, borrow, fill and till.
	.2	Unsuitable material: all material which is not suitable for use in work and must be disposed of.
	.3	Surplus material: excavated material not required for reuse.
	.4	Subgrade: The surface of mass excavation and embankment finished to lines and elevations indicated. The top of the finished subgrade shall be the bottom of the sub-base (premium borrow).
	.5	Sub-base: The surface located immediately above the subgrade. For this project, the sub-base material shall be premium borrow.
	.6	Rock Excavation: limestone, sandstone, granite or similar rocks on solid beds or masses in original or stratified position, which can be removed only by continuous drilling, blasting or use of pneumatic tools, and all boulders of one cubic meter in volume or larger.

1.4 Submittals .1 Samples:
.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
.2 Inform Departmental Representative at least 4 weeks prior to commencing work, of proposed source of fill materials and provide access for sampling.

1.5 Protection of Existing Features .1 Existing buried utilities and structures:
.1 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
.2 Confirm locations of buried utilities by careful test excavations.
.3 Maintain and protect from damage, water, sewer, electric, telephone and other utilities and structures encountered.
.4 Record location of maintained, re-routed and abandoned underground lines.
.5 Confirm locations of recent excavations adjacent to area of excavation.
.2 Existing buildings and surface features:
.1 Conduct, with Engineer, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, pavement, survey bench marks and monuments which may be affected by the work.
.2 Protect existing buildings and surface features from damage while work is in progress. In the event of damage, immediately make repair to approval of Engineer.

PART 2 - PRODUCTS

2.1 Materials .1 Class "A" gravel to Section 32 11 23 - Granular Base.
.2 Premium Borrow to Section 32 11 16.01 - Granular Sub-base.

PART 3 - EXECUTION

3.1 Site
Preparation

- .1 Environmental protection measures shall be installed prior to the beginning of any excavation.
- .2 Remove obstructions, ice and snow from surfaces to be excavated within limits indicated.

3.2 Excavation

- .1 Excavate all types of materials to lines and elevations indicated and as necessary for construction.
- .2 Notify Departmental Representative if in doubt as to definition of material.
- .3 Select method of excavation, support, and dewatering unless otherwise indicated or directed. Protect property and structures from damage.
- .4 Cut paved surfaces in straight lines.
- .5 Extend excavations sufficient distance from footings and walls to allow placing and removal of forms and for placing backfill materials indicated.
- .6 Handle materials in a manner that will not endanger the public, personnel, property or the work. Do not reduce sight distances, or obstruct roadways or utilities. Do not obstruct flow of surface drainage or natural watercourses.
- .7 Do not stockpile materials alongside of excavations in such manner that stockpiling will cause side failure or bottom uplift.
- .8 Replace over-excavated material with selected site material, granular material, or unshrinkable fill as directed.
- .9 Notify Departmental Representative whenever unsuitable materials are encountered and remove to depth and extent directed.
 - .1 If such work is due to nature of soil, Departmental Representative and Contractor will jointly measure work for payment.
 - .2 If such work is due to any act or fault of Contractor, remedial work is responsibility of Contractor.
- .10 Dispose of unsuitable or surplus materials off site unless otherwise directed. Departmental Representative may instruct contractor to stockpile or place unsuitable or surplus material within site. Contractor is to become owner of all unsuitable or surplus material.

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- 3.3 Topsoil Excavation
- .1 Strip topsoil to limits and depth indicated or directed. Minimum depth of topsoil excavation is 400 mm.
 - .2 Stockpile in designated areas or dispose as directed. Minimize loss and wastage.
- 3.4 Unsuitable Excavation
- .1 When unsuitable excavation is encountered, notify Departmental Representative and assist in investigation to determine depth and type of material. Isolate area to minimize entry of water into excavation.
 - .2 Excavate unsuitable to extent directed.
 - .3 Dispose of material unsuitable.
- 3.5 Backfilling
- .1 Do not proceed with backfilling operations until Departmental Representative has inspected and approved installations.
 - .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
 - .3 Do not use backfill material which is frozen or contains ice, snow or debris.
 - .4 Backfill with materials indicated on drawings and specified elsewhere within specifications.
 - .5 When using hand operated tamping devices, place backfill materials in layers not exceeding 100 mm in thickness.
 - .6 Control moisture content of backfill materials so that specified compaction may be obtained.
 - .7 Backfilling around installations.
 - .1 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
 - .8 In areas of pedestrian and vehicular traffic, maintain surfaces level with existing surface until reinstatement.
- 3.6 Quality Control
- .1 Contractor to retain services of independent materials testing firm to carry out necessary testing.
 - .2 Contractor to retain services of PEI Land Surveyor for layout and grade certification.
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PART 1 - GENERAL

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| <u>1.1 Description</u> | .1 | This section specifies requirements for recompacting and reshaping of existing and design gravel base, to lines, grades and typical cross sections indicated or as established by Departmental Representative. |
| | .2 | Carry out above requirements following repairs to identified areas requiring excavation, supply and placing of premium borrow, and supply and placing of Class "A" gravel. |
| | .3 | All areas to be paved with asphalt materials are to be fine graded and compacted. |
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| <u>1.2 References</u> | .1 | ASTM D698, Test Method for Laboratory Compaction Characteristics of Soil using Standard Effort 600 kN-m/ m3. |
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| <u>1.3 Definitions</u> | .1 | Reshaping Subgrade: scarifying, pulverizing, blading, reshaping and recompacting existing subgrade surface. |
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| <u>1.4 Related Sections</u> | .1 | Section 32 01 16 - Removal of Existing Asphalt |
| | .2 | Section 32 11 23 - Granular Base |

PART 2 - PRODUCTS

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| <u>2.1 Not Applicable</u> | .1 | Not Applicable |
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PART 3 - EXECUTION

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| <u>3.1 Pulverizing and Reshaping</u> | .1 | Scarify material. |
| | .2 | Blade and trim pulverized material to elevation and cross section dimensions as indicated. |
| | .3 | Where deficiency of material exists, add and blend additional subgrade material as directed by Departmental Representative. |
| | .4 | Re-use existing material in areas of material deficiency as directed by Departmental Representative. |

- 3.2 Compacting .1 Compact to density not less than 100% corrected maximum dry density in accordance with ASTM D698.
- .2 Shape and roll alternately to obtain smooth, even and uniformly compacted subgrade surface.
- .3 Apply water as necessary during compaction to obtain specified density.
- .4 If material is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected to value not greater than 2% moisture above optimum value for compaction in accordance with ASTM D698.
- 3.3 Site Tolerances .1 Reshaped compacted surface using mechanical grader to be within plus or minus 5mm of elevation as indicated.
- 3.4 Protection .1 Maintain reshaped surface in condition conforming to this section until succeeding material is applied or until Departmental Representative acceptance.
- .2 If the final top of gravel surface is damaged in any way through traffic, weather, or other items, regrade and recompact as specified.
- 3.5 Quality Control .1 Contractor to retain services of a registered PEI Land Surveyor for layout and grade certification.
- .2 Set grades to match existing top of concrete gutter and as provided, unless otherwise instructed.
- .3 Confirm no surface water ponding will occur following completion of grading all Class "A" gravel materials and following placing of all asphalt base and seal materials.
- .4 Prior to placing asphalt seal materials, flood the entire area with water. If ponding occurs, adjust using asphalt padding prior to placing final asphalt seal coat.
- .5 Provide written confirmation to the Departmental Representative that no surface water ponding will occur prior to approving Class "A" gravel grades.

PART 1 - GENERAL

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| <u>1.1 Description</u> | .1 | This section covers the full depth pavement removal of existing asphalt within the project limits. |
| | .2 | The Contractor shall become sole owner of all milled asphalt and shall remove all milled asphalt from site. |
| <u>1.2 Related Sections</u> | .1 | Section 31 23 33.01 - Excavating, Trenching and Backfilling |
| | .2 | Section 31 26 13 - Reshaping Parking Lot/Driveway Subgrade |
| | .3 | Section 32 11 16.01 - Granular Sub-Base |
| <u>1.3 Waste Management and Disposal</u> | .1 | The Contractor shall submit to the Departmental Representative a letter attesting to the destination of the asphalt materials removed from site. |
| | .2 | The asphalt materials shall be transported to a site where it will be recycled or stocked for future recycling. |
| | .3 | Use removal and transportation methods and materials that do not displace nor damage the layers below the asphalt. |
| <u>1.4 Asphalt Corings</u> | .1 | Asphalt corings have been carried out. For approximate locations and existing thickness at the core locations, see Appendix "A". |

PART 2 - PRODUCTS

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| <u>2.1 Not Applicable</u> | .1 | Not Applicable |
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PART 3 - EXECUTION

- 3.1 Preparation
- .1 Prior to commencing removal operation, inspect and verify with Departmental Representative areas, depths and lines of asphalt concrete pavement to be removed.
 - .2 For full depth pavement removal, cut existing pavement vertically to full depth of asphalt surface.
- 3.2 Equipment
- .1 Use milling equipment and other equipment capable of removing asphalt concrete pavement surface to depths or grades indicated.
- 3.3 Removal
- .1 Remove existing asphalt pavement to top of existing granular base and dispose of materials outside of project boundaries and as specified.
 - .2 Use equipment and methods of removal and hauling which do not tear, gouge, break or otherwise damage or disturb underlying.
 - .3 Prevent contamination of removed asphalt concrete pavement and granular base by topsoil, underlying gravel or other materials.
 - .4 Provide for suppression of dust generated by removal process.
 - .5 Reshape and compact underlying material to Section 31 26 13.
 - .6 In areas where localized pavement removal is carried out within the traffic lane, ensure traffic is restricted from area until the surface is restored.
 - .7 Place gravel and patch with asphalt immediately following removal operation.
 - .8 With a sawcut, delimit the asphalt zone to remove.
- 3.4 Tolerance
- .1 Compacted surface shall be within plus or minus 5mm of elevations established by the engineer, but not uniformly high or uniformly low.
- 3.5 Traffic Control
- .1 Maintain one lane of traffic at all times.
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3.6 Scheduling .1 All work is to be carried out on this project during weekend times.

3.7 Proof Roll Test .1 Prior to placing any materials over existing gravel surface, carry out "Proof Roll Test."

PART 1 - GENERAL

<u>1.1 Related Sections</u>	.1	Section 01 74 21 - Construction/Demolition Waste Management
	.2	Section 31 23 33.01 - Excavating, Trenching and Backfilling
	.3	Section 32 01 16 - Removal of Existing Asphalt
	.4	Section 32 11 23 - Granular Base
	.5	Section 32 16 15 - Concrete Walks, Curbs and Gutters
<u>1.2 References</u>	.1	American Society for Testing and Materials (ASTM)
	.1	ASTM C117-04, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
	.2	ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
	.3	ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
	.4	ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600kN-m/m ³).
	.5	ASTM D1557-07, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700kN-m/m ³).
	.6	ASTM D1883-07, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
	.7	ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
	.2	Canadian General Standards Board (CGSB)
	.1	CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
	.2	CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
<u>1.3 Waste Management and Disposal</u>	.1	Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management.

PART 2 - PRODUCTS

- 2.1 Materials .1 Granular sub-base: material in accordance with the following requirements:
- .1 Premium Borrow:
 - .1 Composed of clean, uncoated particles free from lumps of clay and other deleterious materials.
 - .2 No more than 15% shall pass the number 75um sieve and no materials shall be retained on a 100mm sieve.
 - .3 That portion of premium borrow material passing a 4.75mm sieve shall have a maximum of 20 percent finer than 75um as tested when delivered to site.
 - .4 The percent by mass passing the 12.5mm sieve shall not exceed 75%.
 - .5 All premium borrow is to contain a sufficient amount of gravel sizes following placement/compaction to ensure stable conditions.

PART 3 - EXECUTION

- 3.1 Sequence of Operation .1 Placing:
- .1 Place granular sub-base after subgrade is inspected and approved by Departmental Representative.
 - .2 Construct granular sub-base to depth and grade in areas indicated.
 - .3 Ensure no frozen material is placed.
 - .4 Place material only on clean unfrozen surface, free from snow and ice.
 - .5 Begin spreading base material on crown line or on high side of one-way slope.
 - .6 Place material using methods which do not lead to segregation or degradation of aggregate.
 - .7 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.
 - .8 Place material to full width in uniform layers not exceeding 200 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
 - .9 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
 - .10 Remove and replace that portion of layer in which material becomes segregated during spreading.

3.1 Sequence of
Operation
(Cont'd)

- .2 Compaction Equipment
 - .1 Compaction equipment to be capable of obtaining required material densities.
- .3 Compacting
 - .1 Compact to density not less than 100% Standard Proctor Maximum Density in accordance with ASTM D698.
 - .2 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
 - .3 Apply water as necessary during compacting to obtain specified density.
 - .4 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
 - .5 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.
- .4 Excavation areas shall be identified as areas shown on drawings and labelled "Sub-Base Repair" and those areas identified as a result of the "Proof Roll" test carried out on top of all gravel surfaces following removal of existing asphalt materials. Excavation shall consist of removal of all existing gravel materials and further excavation of a minimum of 300mm depth. Prior to placing any materials, carry out a "Proof Roll" test on subgrade material. The proof roll test shall consist of the following and shall be taken in the presence of the Departmental Representative and the Contractor's materials testing firm experienced with this type of test.
 - .1 Prepare a fully loaded tandem truck.
 - .2 Drive truck along the entire driveway, parking lot and all previously paved areas, in a longitudinal manner. Cover the entire area with no more than 2.0 meters between each line of wheel tracks.
 - .3 Observe deflection on subgrade in a continuous manner. If deflection at any location is greater than 10mm or if excessive cracking occurs, obtain direction from Departmental Representative.
 - .4 Excavate to a lower elevation at locations as identified by the Departmental Representative. All excavations shall be tapered from original grade at a 5 horizontal to 1 vertical ratio.
- .5 Place premium borrow in 150mm thick lifts unless directed otherwise by the Departmental Representative. Compact to a 100 percent Standard Proctor Density.
- .6 Shape and roll alternately to obtain a smooth, even and uniform compacted layer.
- .7 The shaping and compaction operation shall continue until the surface conforms to the specified requirements and shall be repeated as required to maintain the surface until it is covered by gravel material.

- 3.1 Sequence of Operation (Cont'd)
- .8 The maximum acceptable deviation from grade at any location shall be 5 mm above or below that specified.
- .9 Confirm all premium borrow material has been placed to required lines and grades prior to placing Class "A" gravel.
- .10 If truck traffic is utilizing areas where premium borrow and select borrow has been placed, excavate the top 10 mm of material to remove potentially contaminated material. Replace and regrade as required.
- 3.2 Site Tolerances
- .1 Finished base surface to be within plus or minus 5mm of established grade and cross section but not uniformly high or low.
- 3.3 Protection
- .1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by Departmental Representative.
- 3.4 Quality Control
- .1 Contractor to retain services of independent materials testing firm to carry out necessary testing.
- .2 Contractor to retain services of PEI Land Surveyor for layout and grade certification.

PART 1 - GENERAL

- 1.1 Related Sections
- .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
 - .2 Section 31 26 13 - Reshaping Parking Lot/Driveway Subgrade
 - .3 Section 32 16 15 - Concrete Walks, Curbs and Gutters.
 - .4 Section 31 11 16.01 - Granular Sub-Base
- 1.2 Measurement Procedures
- .1 Granular base shall be paid for on a per tonne basis.
- 1.3 References
- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C 117-95, Standard Test Methods for Material Finer than 0.075 mm Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C 131-96, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .3 ASTM C 136-96a, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .4 ASTM D 422-63(1998), Standard Test Method for Particle-Size Analysis of Soils.
 - .5 ASTM D 698-00a, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600kN-m/m³).
 - .6 ASTM D 1557-00, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (2,700kN-m/m³).
 - .7 ASTM D 1883-99, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
 - .8 ASTM D 4318-00, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
 - .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
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PART 2 - PRODUCTS

- 2.1 Materials .1 Granular base material Class "A": in accordance with following requirements:
- .1 Crushed gravel.
 - .2 Gradations to be within limits specified when tested to ASTM C 136 and ASTM C 117. Sieve sizes to CAN/CGSB-8.2.
 - .3 Table
- | Sieve Designation | % Passing |
|-------------------|-----------|
| 50.0 mm | --- |
| 45.0 mm | --- |
| 38.0 mm | --- |
| 31.5 mm | 100 |
| 25.0 mm | 95-100 |
| 19.0 mm | --- |
| 12.5 mm | 50-83 |
| 9.5 mm | --- |
| 4.75 mm | 30-60 |
| 1.18 mm | 15-40 |
| 600 um | 10-32 |
| 300 um | 5-22 |
| 75 um | 3-9 |
- .4 Other Properties as follows:
- .1 The Granular Class "A" material shall have a minimum of 13% retained between the 4.75mm and 600um sieves.
 - .2 The percent of crushed material will be determined on the fraction of particles by mass retained on the 4.75mm sieve having 2 or more fractured faces.
 - .3 Los Angeles Abrasion: to ASTM C 131. Maximum Percent Loss: 35.
 - .4 Petrographic Number: 150.
 - .5 Crushed Minimum Percent: 75.
- .2 Class "A" to be supplied from an off-site source.

PART 3 - EXECUTION

- 3.1 Placing .1 Place granular base after Proof Roll test is completed and repairs to sub-base have been completed. The Proof Roll test shall consist of the following and shall be taken in the presence of the Departmental Representative and the Contractor's materials testing firm experienced with this type of test.
- .1 Prepare a fully loaded tandem truck.
 - .2 Drive truck along the entire driveway, parking lot and all previously paved areas, in a longitudinal manner. Cover the entire area with no more than 2.0 meters between each line of wheel tracks.

3.1 Placing
(Cont'd)

- .1 (Cont'd)
 - .3 Observe deflection on sub-grade in a continuous manner. If deflection at any location is greater than 5mm or if excessive cracking occurs, obtain direction from Departmental Representative.
 - .4 Excavate to a lower elevation at locations as identified by the Departmental Representative. All excavations shall be tapered from original grade at a 5 horizontal to 1 vertical ratio.
- .2 Construct granular base to depth and grade in areas indicated.
- .3 Ensure no frozen material is placed.
- .4 Place material only on clean unfrozen surface, free from snow or ice.
- .5 Place granular base materials using methods which do not lead to segregation or degradation.
- .6 Place material to full width in uniform layers not exceeding 150mm compacted thickness. Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
- .7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .8 Remove and replace portion of layer in which material has become segregated during spreading.

3.2 Compaction

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact Class "A" to density of not less than 100% the Standard Proctor Maximum Density ASTM D698-78, Method D.
- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
- .4 Apply water as necessary during compaction to obtain specified density.
- .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
- .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

- 3.3 Site Tolerances .1 Finished Class "A" base surface to be within 5mm of elevation as indicated but not uniformly high or low.
- .2 Ensure no surface water ponding or low areas are present following placement of Class "A" gravel materials.
- 3.4 Protection .1 Maintain finished base in condition conforming to this section until succeeding base is constructed, or until granular base is accepted by Departmental Representative.
- 3.5 Quality Control .1 Contractor to retain services of independent materials testing firm to carry out necessary testing.
- .2 Contractor to retain services of PEI Land Surveyor for layout and grade certification.
- .3 Provide certification from Surveyor that no surface ponding will occur.
- 3.6 Gravel Adjustment Allowance .1 The Contractor shall be aware that existing asphalt thickness varies throughout. It is required that all existing asphalt be removed and new asphalt materials be placed at uniform thickness as follows:
- | | | |
|----------|---------------|-------------|
| Phase 1: | Asphalt Base | 75mm |
| . | Asphalt Seal | <u>50mm</u> |
| . | Total Asphalt | |
| . | Thickness | = 125mm |
- Phases 2 & 3:
- | | | |
|---|---------------|-------------|
| . | Asphalt Base | 60mm |
| . | Asphalt Seal | <u>40mm</u> |
| . | Total Asphalt | |
| . | Thickness | = 100mm |
- .2 The following table provides an indication of required adjustments to the existing gravel grade in order to meet requirements of maintaining existing top of asphalt grades (with the exception of placing asphalt flush with top of concrete gutter and at other locations identified on drawings), and providing a uniform asphalt thickness for the phases identified above. At locations where it is required to add various thicknesses, use Class "A" gravel. At locations where it is required to remove various thicknesses, remove all materials from site unless instructed otherwise by the Departmental Representative.

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3.6 Gravel .2 (Cont'd)
Adjustment
Allowance
(Cont'd)

All thickness adjustments are relevant at the
specific coring location only. Actual site
conditions will vary.

3.6 Gravel .2 (Cont'd)
Adjustment
Allowance
(Cont'd)

Core Location	Existing Asphalt Thickness at this Location (mm)	Design Asphalt Thickness at this Location (mm)	Difference (Add Class "A" Gravel, Remove Existing Gravel)
P1-1	115	100	Add 15mm
P2-1	135	100	Add 35mm
P2-2	135	100	Add 35mm
P3-1	120	100	Add 20mm
P3-2	105	100	Add 5mm
P4-1	95	100	Remove 5mm
P5-1	100	100	No Change
P5-2	100	100	No Change
P6-1	95	100	Remove 5mm
P6-2	105	100	Add 5mm
P7-1	95	125	Remove 30mm
R1-1	90	125	Remove 35mm
R1-2	155	125	Add 30mm
R2-1 west	135	125	Add 10mm
R2-2 south	165	125	Add 40mm
R2-3 south	105	125	Add 20mm
R2-4 East	145	125	Add 20mm

PART 1 - GENERAL

<u>1.1 Related Sections</u>	.1	Section 01 33 00 - Submittal Procedures.
	.2	Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
	.3	Section 32 12 16 - Asphalt Paving.
<u>1.2 References</u>	.1	American Society for Testing and Materials International, (ASTM) .1 ASTM D140-01, Standard Practice for Sampling Bituminous Materials.
	.2	Canadian General Standards Board (CGSB) .1 CAN/CGSB-16.2-M89, Emulsified Asphalts, Anionic Type, for Road Purposes.
<u>1.3 Submittals</u>	.1	Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
	.2	Sample asphalt tack coat material to: ASTM D140.
	.3	Provide access on tank truck for Departmental Representative to sample asphalt material to be incorporated into Work, in accordance with ASTM D140.
<u>1.4 Quality Assurance</u>	.1	Upon request by Departmental Representative, submit manufacturer's test data and certification that asphalt tack coat material meets requirements of this section.
<u>1.5 Delivery, Storage and Handling</u>	.1	Deliver, store and handle materials in accordance with ASTM D140.
	.2	Provide, maintain and restore asphalt storage area.
<u>1.6 Waste Management and Disposal</u>	.1	Separate waste materials for reuse and recycling in accordance with Section 01 74 21.
	.2	Divert unused asphalt from landfill to facility capable of recycling materials.

PART 2 - PRODUCTS

- 2.1 Materials
- .1 Anionic emulsified asphalt: to PEI Transportation & Infrastructure Renewal SS-1H.
 - .2 Water: clean, potable, free from foreign matter.
- 2.2 Equipment
- .1 Pressure distributor to be:
 - .1 Designed, equipped, maintained and operated so that asphalt material can be:
 - .1 Maintained at even temperature.
 - .2 Applied uniformly on variable widths of surface up to 5 m.
 - .3 Applied at readily determined and controlled rates with uniform pressure.
 - .4 Distributed in uniform spray without atomization at temperature required.
 - .2 Equipped with meter, registering metres of travel per minute, visibly located to enable truck driver to maintain constant speed required for application at specified rate.
 - .3 Equipped with pump having flow meter graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.
 - .4 Equipped with an easily read, accurate and sensitive device which registers temperature of liquid in reservoir.
 - .5 Equipped with accurate volume measuring device or calibrated tank.
 - .6 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.
 - .7 Equipped with nozzle spray bar, with operational height adjustment.
 - .8 Cleaned if previously used with incompatible asphalt material.

PART 3 - EXECUTION

- 3.1 Application
- .1 Obtain Departmental Representative's approval of surface before applying asphalt tack coat.
 - .2 Apply asphalt tack coat only on clean and dry surface.
 - .3 Apply asphalt tack coat evenly to pavement surface at rate of 0.14 litres/m² or as directed by Departmental Representative.
 - .4 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt tack coat material.
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3.1 Application
(Cont'd)

- .5 Do not apply asphalt tack coat when air temperature is less than 10 degrees C or when rain is forecast within 2 hours of application.
- .6 Apply asphalt tack coat only on unfrozen surface.
- .7 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.
- .8 Where traffic is to be maintained, treat no more than one half of width of surface in one application.
- .9 Keep traffic off tacked areas until asphalt tack coat has set.
- .10 Re-tack contaminated or disturbed areas as directed by Departmental Representative.
- .11 Permit asphalt tack coat to set before placing asphalt pavement.
- .12 Provide advance warning to adjacent landowners of tack operations schedule.
- .13 Provide adequate signage to warn general public of tack application. Provide adequate personnel to assist the public in avoiding walking through tacked areas and subsequent damage to footwear and tracking into buildings.

PART 1 - GENERAL

1.1 Related
Sections

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management.
- .3 Section 32 12 13.16 - Asphalt Tack Coat.
- .4 Section 32 17 23 - Pavement Markings.
- .5 Section 01 45 00 - Testing and Quality Control
- .6 Section 01 29 83 - Payment Procedures for Testing Laboratory

1.2 References

- .1 Prince Edward Island Department of Transportation, Infrastructure and Energy Standard Specification.

1.3 Product Data

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C at least 4 weeks prior to beginning Work.
- .3 Submit manufacturer's test data and certification that asphalt cement meets requirements of this Section.
- .4 Submit manufacturer's test data and certification that hydrated lime meets requirements of this Section.
- .5 Submit asphalt concrete mix design and trial mix test results to Departmental Representative for approval review at least 4 weeks prior to beginning Work.

1.4 Samples

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Inform Departmental Representative of proposed source of aggregates and provide access for sampling at least 4 weeks prior to beginning Work.

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| <u>1.5 Waste Management and Disposal</u> | <ul style="list-style-type: none">.1 Separate waste materials for disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management..2 Divert unused aggregate materials from landfill to facility capable of recycling materials. |
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| <u>1.6 Quality Control</u> | <ul style="list-style-type: none">.1 Contractor to retain services of independent materials testing firm to carry out necessary testing. |
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| <u>1.7 Proof Roll Test</u> | <ul style="list-style-type: none">.1 Prior to placing any asphalt base materials, carry out Proof Roll test. |
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PART 2 - PRODUCTS

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| <u>2.1 Materials</u> | <ul style="list-style-type: none">.1 Asphalt cement: hot mixed, hot-laid combination of mineral aggregates, uniformly coated and mixed with an asphaltic binder in a suitable mixing plant. Asphalt materials and aggregates shall meet the requirements of Section 603 of PEI Transportation, Infrastructure and Energy Standard Specification..2 Composition of asphalt mixture: to grading and asphalt content requirements of Section 603 of PEI Transportation, Infrastructure and Energy Standard Specification.<ul style="list-style-type: none">.1 Asphalt Base "A" Mixture.2 Asphalt Seal "B" Mixture |
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| <u>2.2 Equipment</u> | <ul style="list-style-type: none">.1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated..2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix..3 Vibratory rollers:<ul style="list-style-type: none">.1 Minimum drum diameter: 1200 mm..2 Maximum amplitude of vibration (machine setting): 0.5 mm for lifts less than 40 mm thick..4 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:<ul style="list-style-type: none">.1 Boxes with tight metal bottoms..2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded. |
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2.2 Equipment
(Cont'd)

- .4 Haul trucks:(Cont'd)
 - .3 In cool weather or for long hauls, insulate entire contact area of each truck box.
 - .4 Use only trucks which can be weighed in single operation on scales supplied.
- .5 Hand tools:
 - .1 Lutes or rakes with covered teeth for spreading and finishing operations.
 - .2 Tamping irons having mass not less than 12 kg and bearing area not exceeding 310 cm² for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Departmental Representative, may be used instead of tamping irons.
 - .3 Straight edges, 4.5 m in length, to test finished surface.
- .6 Plant testing facility: provide laboratory space at plant site for exclusive use of Departmental Representative, for performing tests, keeping records and making reports.
- .7 Material transfer vehicle: capable of transferring while doing some re-blending of the paving material to allow for non-contact continuous paving.

PART 3 - EXECUTION

3.1 Preparation

- .1 When paving over existing asphalt surface, clean pavement surface to approval of Departmental Representative. When levelling course is not required, patch and correct depressions and other irregularities to approval of Departmental Representative before beginning paving operations.
- .2 Apply tack coat in accordance with Section 32 12 13.16 prior to paving over existing asphalt at transitions and between the base and surface courses.
- .3 Prior to laying mix, clean surfaces of loose and foreign material.

3.2 Transportation
of Mix

- .1 Transport mix to job site in vehicles cleaned of foreign material.
- .2 Paint or spray truck beds with limewater, soap or detergent solution, or non petroleum based commercial product, at least daily or as required. Elevate truck bed and thoroughly drain. No excess solution to remain in truck bed.

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- 3.2 Transportation of Mix (Cont'd)
- .3 Schedule delivery of material for placing in daylight, unless Departmental Representative approves artificial light.
 - .4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation. Do not dribble mix into trucks.
 - .5 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.
 - .6 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within specified range, but not less than 135 degrees Celsius.
- 3.3 Test Strip
- .1 Construct test strip in the presence of the Departmental Representative and the Contractor's materials testing firm.
 - .2 During construction of test strip, materials testing firm will establish optimum rolling pattern by taking nuclear densimeter readings and observations to:
 - .1 Determine sequence and number of passes.
 - .2 Determine correct operating characteristics of vibratory rollers.
 - .3 Determine maximum density of asphalt mix.
 - .4 Ensure smooth surface finish.
 - .5 Establish actual density achieved by coring in order to determine if additional or other rolling equipment is required to achieve density of not less than 98% of density obtained with Marshall specimens prepared from samples of mix being used.
- 3.4 Placing
- .1 Obtain Departmental Representative's approval of gravel base prior to placing asphalt.
 - .2 Place asphalt concrete to thicknesses, grades and lines as indicated in accordance with Section 603 of PEI Department of Transportation, Infrastructure and Energy Standard Specifications.
 - .3 Placing conditions:
 - .1 Place asphalt mixtures only when air temperature is above 5 degrees C and rising.
 - .2 When temperature of surface on which material is to be placed falls below 10 degrees C, provide extra rollers as necessary to obtain required compaction before cooling.
 - .3 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.
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3.4 Placing
(Cont'd)

- .4 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300 mm. For all driveway areas, final seal coat joint shall be at the center of the driveway.
- .5 Place individual strips no longer than 500 m.
- .6 Spread and strike off mixture with self propelled mechanical finisher.
 - .1 Construct longitudinal joints and edges true to line markings. Position and operate paver to follow established line closely.
 - .2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver. Work pavers as close together as possible and in no case permit them to be more than 30 m apart.
 - .3 Maintain constant head of mix in auger chamber of paver during placing.
 - .4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
 - .5 Correct irregularities in alignment left by paver by trimming directly behind machine.
 - .6 Correct irregularities in surface of pavement course directly behind paver. Remove by shovel or lute excess material forming high spots. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.
 - .7 Do not throw surplus material on freshly screeded surfaces.
- .7 When hand spreading is used:
 - .1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section. Use measuring blocks and intermediate strips to aid in obtaining required cross-section.
 - .2 Distribute material uniformly. Do not broadcast material.
 - .3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes. Reject material that has formed into lumps and does not break down readily.
 - .4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.
 - .5 Provide heating equipment to keep hand tools free from asphalt. Control temperature to avoid burning material. Do not use tools at higher temperature than temperature of mix being placed.

3.5 Compacting

- .1 Compact asphalt concrete in accordance with Section 603 of PEI Transportation, Infrastructure and Energy Standard Specifications.

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- 3.6 Joints .1 General:
- .1 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.
 - .2 Transverse joints:
 - .1 Offset transverse joint in succeeding lifts by at least 300 mm.
 - .2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.
 - .3 Compact transverse joints to provide smooth riding surface. Use methods to prevent rounding of compacted surface at joints.
 - .3 Longitudinal joints:
 - .1 Offset longitudinal joints in succeeding lifts by at least 150 mm.
 - .2 Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 100 degrees C prior to paving of adjacent lane.
 - .1 If cold joint can not be avoided, cut back by saw cutting previously laid lane, by at least 150 mm, to full depth vertical face, and tack face with thin coat of hot asphalt of adjacent lane.
 - .3 Overlap previously laid strip with spreader by 25 to 50 mm.
 - .4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.
 - .5 Roll longitudinal joints directly behind paving operation.
 - .6 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.
 - .4 Construct asphalt transitions as indicated.
- 3.7 Finish Tolerances .1 Finished asphalt surface to be within 5mm of design elevation but not uniformly high or low.
- .2 Finished asphalt surface not to have irregularities exceeding 5mm when checked with 4.5 m straight edge placed in any direction.
 - .3 Finished asphalt surface shall be flush or slightly above concrete gutter.
- 3.8 Defective Work .1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required. If irregularities or defects remain after final compaction, remove surface course promptly and lay
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3.8 Defective Work (Cont'd)

- .1 (Cont'd)
new material to form true and even surface and compact immediately to specified density.
- .2 Repair areas showing checking, rippling, or segregation.
- .3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

3.9 Ponding Test/Repair

- .1 Following placing of asphalt base material, flood entire area with water to confirm no surface water is present. If ponding occurs, repair using asphalt seal materials and reflood the area to confirm no ponding of surface water is present.
- .2 Following placement of asphalt seal materials, flood entire area with water to confirm no surface water is present. If ponding occurs, repair using asphalt seal materials and/or milling, and reflood the area to confirm no ponding of surface water is present.

PART 1 - GENERAL

- 1.1 References .1 Prince Edward Island Department of Transportation,
Infrastructure and Energy Standard Specifications.

PART 2 - PRODUCTS

- 2.1 Materials .1 Water: to Departmental Representative's approval.

PART 3 - EXECUTION

- 3.1 Application .1 Apply water with equipment approved by Departmental
Representative at rate of 1 L/m² for liquid when
directed by Departmental Representative.
- .2 Failure of the Contractor to provide adequate dust
control measures resulting in suspension of the work
will be the responsibility of the Contractor.

PART 1 - GENERAL

<u>1.1 Related Sections</u>	.1	Section 01 33 00 - Submittal Procedures.
	.2	Section 01 45 00 - Testing and Quality Control.
	.3	Section 03 30 00 - Cast-in-Place Concrete.
	.4	Section 31 23 33.01 - Excavating, Trenching and Backfilling.
	.5	Section 32 11 16.01 - Granular Sub-base.
	.6	Section 32 11 23 - Granular Base.
<u>1.2 References</u>	.1	American Society for Testing and Materials International (ASTM) .1 ASTM C 117-04, Standard Test Method for Materials Finer than 0.075 mm Sieve in Mineral Aggregates by Washing. .2 ASTM C 136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates. .3 ASTM D 698-07AE1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort 600 kN-m/m ³ .
	.2	Canadian General Standards Board (CGSB) .1 CAN/CGSB-3.3-99 (March 2004), Kerosene, Amend. No. 1, National Standard of Canada. .2 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
	.3	Canadian Standards Association (CSA International) .1 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
<u>1.3 Submittals</u>	.1	Submittals in accordance with Section 01 33 00 - Submittal Procedures.
	.2	Product Data: submit WHMIS MSDS in accordance with Section 01 33 00.
	.3	Inform Departmental Representative of proposed source of materials and provide access for sampling at least 4 weeks prior to commencing work.
	.4	If materials have been tested by testing laboratory approved by Departmental Representative within previous 2 months and have passed tests equal to requirements of this specification, submit test certificates from testing laboratory showing suitability of materials for this project.

- 1.4 Delivery, Storage and Handling .1 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21.
- 1.5 Sidewalk .1 Type 1:
.1 Where existing curbs are to remain, elevation shall be at curb height with slope 20mm per m of width towards the top of the curb. The thickness of the slab shall not be less than 125mm.
.2 Where the sidewalk is installed with grass on both sides, Sidewalk Type 1 will be used.
- .2 Type 2:
.1 Where existing curbs have been or are to be removed, elevation shall be 150mm above existing asphalt elevation with a slope of 20mm per m or width towards the street. The thickness of the slab at the gutter shall be 250mm for a width of 250mm, then reducing to 150mm minimum for the remainder of the width.
.2 Where the sidewalk is installed with asphalt on both sides, Sidewalk Type 2 will be used with a 250mm thickness on both edges.
- 1.6 Curb & Gutter .1 Type "B" - Overall width of curb and gutter 560mm or to match existing.

PART 2 - PRODUCTS

- 2.1 Materials .1 Concrete Properties:
.1 Comp. Strength - 35 MPa.
.2 Slump - 80 mm.
.3 Air Content - 5-8%.
.4 Max. Water Content - 0.45 Min.
.5 Min. Cement Content - 335 kg/m³.
.6 Class of Exposure - C2.
- .2 Wire Mesh Reinforcement: 150 x 150 MW 18.7 x MW 18.7 welded wire fabric which meets the requirements of CSA G30.5M.
- .3 Curing Compounds: to CSA A23.1-M, white in color.
- .4 Isolation Joint Filler: to ASTM D1751.

PART 3 - EXECUTION

3.1 Layout

- .1 Width of sidewalk will be as indicted on drawings.
- .2 The dimensions of the slab shall match existing, according to the width of the walk, but will normally be as close to square as possible.
- .3 The Contractor shall supply and install premium borrow and Class "A" gravel to underside of curb and gutter and sidewalk as required to raise to the required level as per the attached drawings.
- .4 The Contractor shall supply and place the concrete on a pre-wet base as per these specifications and the attached sketches.
- .5 In locations where the new walks or curb and gutter is abutting an existing, the connection shall be made as follows:
 - .1 10mm diameter holes shall be drilled along the centerline of the existing sidewalk to a depth of 150mm.
 - .2 For curb & gutter, drill 10mm diameter holes - two in gutter and one in curb section. Place 300mm long 10 m rebar into holes. Wrap protruding end with polyethylene to permit slippage.
 - .3 The end holes shall be 150mm from front to back at the slab. The other holes shall be equally spaced to a maximum spacing of 300mm unless otherwise approved by the Departmental Representative.
 - .4 300mm long dowels of 10M rebar shall be tapped into each of these holes and the 150mm protruding shall be wrapped in polyethylene to permit slippage.
- .6 When connecting to existing walks or curbs and gutters, the Contractor shall be required to saw cut the existing before removing the broken sections or sections to be removed.
- .7 Construction joints shall be provided where concrete work is interrupted or stopped. These joints are to be coated with oil, so they will serve as control joints. All connection between control joints shall be as per 3.1.5.
- .8 Expansion joints shall be provided at intervals of 50 meters or less on straight runs of sidewalk. These joints are to be coated with oil, have isolation joints filler, and be pinned with rebar.
- .9 Control joints having a depth not less than 1/4 the depth of the sidewalk and a width not greater than 6 mm shall be provided at intervals of 3.0 m intervals for curb and gutter and 1.5 m for concrete walks unless otherwise specified by the Departmental Representative. These joints shall be saw cut.

3.1 Layout
(Cont'd)

- .9 (Cont'd)
Sawcutting may be performed if done as soon as concrete has set sufficiently to resist ravelling and before shrinkage occurs.
- .10 Isolation joints shall be provided along the face of the abutting buildings or structures and along existing curb.
- .11 At intersections and islands, the sidewalk is to be tapered to the street level to allow wheelchair access. The location of these tapers is to be approved by the Departmental Representative. The slope of these tapers shall be less than 1:12.
- .12 The sidewalk shall be lowered at all driveways and ramps and the slab at these sections is to be 150mm thick complete with wire mesh reinforcement. The slab thickness shall be increased to 150mm at the intersections if there is a possibility of vehicles travelling over the corner of the sidewalk. These locations are to be determined by the Departmental Representative. The sidewalk shall be lowered at a slope not exceeding 1:12.
- .13 Non-skid surface shall be provided on all sidewalks.
- .14 Prior to placing concrete, wet prepared surface with water. Water to CAN3-A23.1 and shall not have any deleterious effects on the concrete.
- .15 .1 Concrete curing shall be conducted using white pigmented liquid membrane forming curing compound meeting ASTM Designation CS 309 Type 2. Clear liquid membrane forming compound meeting ASTM Designation CS 309 Type 1 may be used subject to Departmental Representative's prior approval if the temperature is low or if the concrete is not exposed to direct sunlight.
.1 Compound shall be applied by suitable low pressure spray method and is in strict conformance with the manufacturer's recommendations.
.2 Slab edges shall be sprayed within 1 hour of removal of forms.
.3 Re-spray areas where membrane has been damaged during the first 4 days due to the sawing of joints or other factors.
.4 Curing compound will not be permitted after October 1st.
.5 Following October 1st, alternate curing and sealing methods will be required to the approval of the Departmental Representative.
- .16 .1 Concrete poured after October 1st shall be protected from de-icing salts by two applications of boiled linseed oil thinned with naptha, mineral spirits or turpentine. A mixture of 50% oil and 50% thinner shall be used. An alternate sealing method

3.1 Layout
(Cont'd)

- .16 (Cont'd)
may be approved subject to prior written approval from the Departmental Representative.
- .1 Approximately 1 litre of mixture per 11 square metres of surface shall be used for the first application and approximately 1 litre of mixture per 15 square metres shall be used for the second application.
- .2 The second application shall be applied only after the first application has been absorbed and the sidewalk has regained its dry appearance.
- .3 The first application shall be applied before any chance of freezing, but in no case shall it be applied less than 7 days after the pouring of concrete.
- .17 The Contractor shall supply and place topsoil and sod along the edges of the sidewalks to the approval of the Departmental Representative.
- .18 The Contractor shall supply, place and compact asphalt pavement along the edges of the sidewalk to the approval of the Departmental Representative.

3.2 Quality Control

- .1 Contractor to retain services of independent materials testing firm to carry out necessary testing.

PART 1 - GENERAL

- 1.1 Related Work .1 Section 01 33 00 - Submittal Procedures.
.2 Section 32 12 16 - Asphalt Paving.
- 1.2 Work Included .1 This section includes the supply and placing of paint to be applied for traffic lines, parking lines and walkways, including cross-hatch areas and gore areas.
.2 This section also includes the supply and placing of paint for handicap spaces, fire lane and No Parking areas.
.3 It is the intent of this section that all paint lines, cross hatch areas, gore areas and symbols presently on site be replaced to their original location following placement of new asphalt materials.
- 1.3 Definitions .1 CAN/CGSB-1.5-M91, Low Flash Petroleum Spirits Thinner.
.2 CGSB 1-GP-12C-68, Standard Paint Colors.
.3 CGSB 1-GP-71-83, Method of Testing Paints and Pigments.
.4 CGSB 1-GP-74M-79, Paint, Traffic, Alkyd.
- 1.4 Samples .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
.2 Submit to Departmental Representative the following material sample quantities at least 4 weeks prior to commencing work.
.1 Two (2) one-litre samples of each type of paint.
.2 One (1) kg sample of glass beads.
.3 Sampling to CGSB 1-GP-71.
.3 Mark samples with name of project and its location, paint manufacturer's name and address, name of paint, CGSB specification number and formulation number and batch number.
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- 1.5 Application .1 Apply all paint and glass beads on four (4) occasions. Apply on two (2) occasions on top of asphalt base material and apply on two (2) occasions when asphalt seal material has been placed.

PART 2 - PRODUCTS

- 2.1 Materials .1 Paint:
.1 To CGSB 1-GP-74M, alkyd traffic paint.
.2 To CGSB 1-GP-149M, alkyd reflectorized traffic paint.
.3 Colour: to CGSB 1-GP-12C, yellow 505-308, yellow 513-301.
.4 Colour for handicapped areas as specified and as outlined on plans.
.2 Thinner: to CAN/CGSB 1.5.
.3 Glass Beads:
.1 Overlay Type: to CGSB 1-GP-74M.

PART 3 - EXECUTION

- 3.1 Equipment Requirements .1 Paint applicator to be an approved pressure type distributor capable of applying paint in single, double and dashed lines. Applicator to be capable of applying marking components uniformly, at rates specified, and to dimensions as indicated, and to have positive shut-off.
.2 Distributor to be capable of applying reflective glass beads as an overlay on freshly applied paint.
- 3.2 Condition of Surfaces .1 Pavement surface to be dry, free from ponded water, frost, ice, dust, oil, grease and other foreign materials.
- 3.3 Application .1 Pavement markings to be laid out by Contractor.
.2 Unless otherwise approved by Departmental Representative, apply paint only when air temperature is above 10°C, wind speed is less than 60 km/hr and no rain is forecast within the next 4 hours.
.3 Apply traffic paint evenly at rate of 3m²/L.
.4 Do not thin paint unless approved by Departmental Representative.

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|---|--------|---|
| <u>3.3 Application</u>
<u>(Cont'd)</u> | .5 | Symbols and letters to conform to dimensions indicated. |
| | .6 | Paint lines to be of uniform colour and density with sharp edges. |
| | .7 | Thoroughly clean distributor tank before refilling with paint of different colour. |
| | .8 | Apply glass beads at a rate of 200 g/m2 of painted area immediately after application of paint. |
|
<u>3.4 Tolerance</u> |
.1 |
Paint markings to be within plus or minus 12mm of dimensions indicated. |
| | .2 | Remove incorrect markings in accordance with Departmental Representative's instructions. |
|
<u>3.5 Protection of Completed Work</u> |
.1 |
Protect pavement markings until dry. |
|
<u>3.6 Reapplication</u> |
.1 |
All pavement markings are to be applied to the following requirements:
.1 48 hours and 96 hours after placing asphalt base material.
.2 48 hours and 30 days after placing asphalt seal material. |

PART 1 - GENERAL

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| <u>1.1 Scope of Work</u> | .1 | This section specifies topsoil, topsoil amendments, the stripping of topsoil, the preparation of existing grades, the placement of topsoil, and finish grading. |
| <u>1.2 Related Sections</u> | .1 | Section 01 35 43 - Environmental Procedures |
| | .2 | Section 32 92 23 - Sodding |
| <u>1.3 Quality Assurance</u> | .1 | Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties. |
| | .2 | Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements. |
| | .3 | Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements. |
| <u>1.4 Testing</u> | .1 | All soil and sand used in this project shall be tested for compliance with texture specification by a laboratory designated by the Owner. Soil sampling, testing and analysis to be in accordance with Provincial regulations and standards. Contractor will arrange and pay for cost of tests. |
| <u>1.5 Waste Management and Disposal</u> | .1 | Separate and recycle waste materials. |
| | .2 | Divert unused soil amendments from landfill to official hazardous material collections site approved by Municipality. |
| | .3 | Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard. |
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PART 2 - PRODUCTS

2.1 Topsoil

- .1 Topsoil for this project to consist of topsoil stripped from site and imported topsoil to be supplied by the Contractor.
- .2 Topsoil: mixture of mineral particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth, free of debris, weeds, foreign objects, toxic materials and stones and roots greater than 20mm length.
- .3 Soil Texture: sandy loam, based on the Canadian System of Soil Classification, to the following particle distribution and gradation:
- | Particle Type | Distribution
by Volume | Acceptable
Range |
|----------------------|---------------------------|---------------------|
| Very coarse sand | 10% | 10% or less |
| Coarse & medium sand | 45% | 42-47% |
| Fine sand | 15% | 13-17% |
| Very fine sand | 10% | 8-12% |
| Clay | 20% | 18-23% |
-
- | Particle Type | Gradation |
|------------------|-------------------|
| Very coarse sand | 2.0 - 1.0 mm |
| Coarse sand | 1.0 - 0.5 mm |
| Medium sand | 0.5 - 0.25 mm |
| Fine sand | 0.25 - 0.15 mm |
| Very fine sand | 0.15 - 0.106 mm |
| Clay | less than 0.06 mm |
- .4 Organic matter: 4 - 20% by dry weight volume, well decomposed and stable. Organic material measuring 20 mm will not exceed 2% by volume.
- .5 pH range: 6.0 - 7.0
- .6 Consistency: friable when moist.
- .7 Fertility: major soil nutrients present in the following ratios:
- .1 Nitrogen (N): 20 to 40 micrograms of available N per gram of topsoil.
- .2 Phosphorus (P): 10 to 20 micrograms of phosphate per gram of topsoil.
- .3 Potassium (K): 80 to 120 micrograms of potash per gram of topsoil.
- .4 Calcium, magnesium, sulphur and/or establishment of intended vegetation.

- 2.2 Source Quality Control
- .1 Advise Departmental Representative of sources of topsoil to be utilized with sufficient lead time for testing.
 - .2 Contractor is responsible for amendments to supply topsoil as specified.

PART 3 - EXECUTION

- 3.1 Stripping of Topsoil
- .1 Commence topsoil stripping of areas after all wood, brush and grasses have been removed from site.
 - .2 Strip and pulverize topsoil to depths as indicated. Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.
 - .3 Stockpile in locations as directed by Departmental Representative. Stockpile height not to exceed 2 metres.
 - .4 Unused topsoil is to remain on site.
 - .5 Protect stockpiles from contamination and compaction.

- 3.2 Preparation of Existing Grade
- .1 Verify that grades are correct. If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.
 - .2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
 - .3 Remove debris, roots, branches, stones in excess of 25mm diameter and other deleterious materials. Remove soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris which protrudes more than 75mm above surface. Dispose of removed material off site.
 - .4 Cultivate entire area which is to receive topsoil to minimum depth of 100mm. Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

- 3.3 Placing and Spreading of Topsoil/Planting Soil
- .1 Place topsoil after Departmental Representative has accepted subgrade.
 - .2 Spread topsoil in uniform layers not exceeding 150mm.
 - .3 Spread topsoil/planting soil to following minimum depths after settlement.
 - .1 150mm for seeded areas.
 - .2 500mm for shrub beds.
 - .4 Manually spread topsoil/planting soil around trees, shrubs and obstacles.
- 3.4 Soil Amendments
- .1 For planting beds and turf areas: apply and thoroughly mix soil amendments into full specified depth of topsoil at following rates recommended by soil analysis.
- 3.5 Finish Grading
- .1 Grade to eliminate rough spots and low areas and ensure positive drainage. Prepare loose friable bed by means of cultivation and subsequent raking.
 - .2 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative. Leave surfaces smooth, uniform and firm against deep footprinting.
- 3.6 Acceptance
- .1 Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.
- 3.7 Surplus Material
- .1 Dispose of surplus materials off site.
- 3.8 Cleaning
- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.
 - .2 Clean all exposed rock and boulder surfaces to approval of Departmental Representative.

PART 1 - GENERAL

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| <u>1.1 Related Sections</u> | .1 | Section 01 33 00 - Submittal Procedures. |
| | .2 | Section 32 91 21 - Topsoil Placement and Grading. |
| <u>1.2 Submittals</u> | .1 | Samples. |
| | .1 | Submit samples in accordance with Section 01 33 00 - Submittal Procedures. |
| | .2 | Submit: |
| | .1 | Sod for each type specified. |
| | .1 | Install approved samples in one square metre mock-ups and maintain in accordance with maintenance requirements during establishment period. |
| | .3 | Obtain approval of samples by Departmental Representative. |
| <u>1.3 Quality Assurance</u> | .1 | Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties. |
| | .2 | Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements. |
| | .3 | Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements. |
| <u>1.4 Scheduling</u> | .1 | Schedule sod laying to coincide with preparation of soil surface. |
| | .2 | Schedule sod installation when frost is not present in ground. |
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PART 2 - PRODUCTS

- 2.1 Materials
- .1 Number One Turf Grass Nursery Sod: sod that has been especially sown and cultivated in nursery fields as turf grass crop.
 - .1 Turf Grass Nursery Sod types:
 - .1 Number One Kentucky Bluegrass Sod: Nursery Sod grown solely from seed of cultivars of Kentucky Bluegrass, containing not less than 50% Kentucky Bluegrass cultivars.
 - .2 Number One Kentucky Bluegrass Sod - Fescue Sod: Nursery Sod grown solely from seed mixture of cultivars of Kentucky Bluegrass and Chewing Fescue or Creeping Red Fescue, containing not less than 40% Kentucky Bluegrass cultivars and 30% Chewing Fescue or Creeping Red Fescue cultivars.
 - .3 Number One Named Cultivars: Nursery Sod grown from certified seed.
 - .2 Turf Grass Nursery Sod quality:
 - .1 Not more than 2 broadleaf weeds or 10 other weeds per 40 square metres.
 - .2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.
 - .3 Mowing height limit: 35 to 65 mm.
 - .4 Soil portion of sod: 12 to 25 mm in thickness.
 - .2 Fertilizer:
 - .1 To Canada "Fertilizers Act" and "Fertilizers Regulations".
 - .2 Complete, synthetic, slow release with 65% of nitrogen content in water-insoluble form.
- 2.2 Source Quality Control
- .1 Obtain approval from Departmental Representative of sod at source.
 - .2 When proposed source of sod is approved, use no other source without written authorization from Departmental Representative.

PART 3 - EXECUTION

- 3.1 Preparation
- .1 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.
 - .2 Fine grade surface free of humps and hollows to smooth, even grade, to tolerance of plus or minus 8 mm, for Turf Grass Nursery Sod surface to drain naturally.
 - .3 Remove and dispose of weeds; debris; stones 25 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials off site.
- 3.2 Sod Placement
- .1 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.
 - .2 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.
 - .3 At all edges cut in sod to existing grass so as to form a smooth surface. Do not overlay existing grass. Cut existing grass at location where existing grass is full and healthy.
 - .4 Roll sod as directed by Departmental Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.
- 3.3 Sod Placement on Slopes and Pegging
- .1 Install and secure geotextile fabric in areas indicated, in accordance with manufacturer's instructions.
 - .2 Start laying sod at bottom of slopes.
 - .3 Peg sod on slopes steeper than 3 horizontal to 1 vertical, within 1 m of catch basins and within 1 m of drainage channels and ditches to following pattern:
 - .1 100 mm below top edge at 200 mm on centre for first sod sections along contours of slopes.
 - .2 Not less than 3-6 pegs per square metre.
 - .3 Not less than 6-9 pegs per square metre in drainage structures. Adjust pattern as directed by Departmental Representative Engineer Consultant.
 - .4 Drive pegs to 20 mm above soil surface of sod sections.

- 3.4 Maintenance during Establishment Period
- .1 Perform following operations from time of installation until acceptance.
 - .2 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100mm.
 - .3 Cut grass to 50mm when or prior to it reaching height of 75mm. Remove clippings which will smother grassed areas.
 - .4 Maintain sodded areas weed free 95%.
- 3.5 Acceptance
- .1 Turf Grass Nursery Sod areas will be accepted by Departmental Representative provided that:
 - .1 Sodded areas are properly established.
 - .2 Sod is free of bare and dead spots.
 - .3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 50 mm.
 - .4 Sodded areas have been cut minimum 2 times prior to acceptance.
 - .2 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.
- 3.6 Maintenance During Warranty Period
- .1 Perform following operations from time of acceptance until end of warranty period:
 - .1 Water sodded Turf Grass Nursery Sod and areas at bi-weekly intervals to obtain optimum soil moisture conditions to depth of 100 mm.
 - .2 Repair and resod dead or bare spots to satisfaction of Departmental Representative.
 - .3 Cut grass and remove clippings to height as follows:
 - .1 Turf Grass Nursery Sod:
 - .1 50 mm during normal growing conditions.
 - .2 Cut grass at 2 week intervals, but at intervals so that approximately one-third of growth is removed in single cut.
 - .3 Eliminate weeds by mechanical or chemical means to extent acceptable to Departmental Representative.
- 3.7 Cleaning
- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

PART 1 - GENERAL

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| <u>1.1 Scope of Work</u> | .1 | The work of this section shall include, but shall not be limited to:
.1 Adjusting catchbasin frames, covers and curbs;
.2 Excavation, concrete, granular bedding, granular backfill, compaction, grout and incidentals required to complete the work;
.3 Surface reinstatement;
.4 Associated work as necessary to complete the installation but not specified elsewhere, all to the full satisfaction of the Departmental Representative. |
| <u>1.2 Related Work</u> | .1 | Section 31 23 10 - Excavating and Backfilling |
| <u>1.3 References</u> | .1 | ASTM C139-85, Specification for Concrete Masonry Units for Construction of Catchbasins and Manholes. |
| | .2 | ASTM C478M-88a, Specification for Precast Reinforced Concrete Manhole Sections. |
| <u>1.4 Material Certification</u> | .1 | At least four weeks prior to commencing work, submit manufacturer's test data and certification that materials meet requirements of this section. Include manufacturer's drawings, information shop drawings where pertinent. |
| <u>1.5 Scheduling of Work</u> | .1 | Schedule work to minimize interruptions to existing services and to maintain existing flow during construction. |
| | .2 | Submit schedule of expected interruptions for approval and adhere to approved schedule. |
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PART 2 - PRODUCTS

- 2.1 Materials
- .1 Bituminous Joint Sealing Compound: CGSB 56-GP-4a.
 - .2 Adjusting Rings: to ASTM C478M.
 - .3 Frames, gratings, covers to dimensions as indicated and following requirements:
 - .1 Metal gratings and covers to bear evenly on frames. A frame with grating or cover to constitute one unit. Assemble and mark unit components before shipment.
 - .2 Grey Iron Castings: to ASTM A48, strength class 30B minimum.
 - .3 Catchbasin Frames and Covers:
 - .1 IMP S-361 grate, frame and curb inlet where catchbasin is installed in a common curb.

PART 3 - EXECUTION

- 3.1 Excavation and Backfill
- .1 Excavate and backfill in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
 - .2 Backfill excavations around manholes and catchbasins with Class "A" gravel granular base.
- 3.2 Installation
- .1 Adjust units in accordance with details indicated, plumb and true to alignment and grade.
 - .2 Set frame and cover to required elevation. Match curb section with adjacent concrete curb and gutter. Parge and make smooth and watertight.
 - .3 Place frame and cover on top section so that top is flush with finished grade or to elevation as indicated. If adjustment required, use concrete ring.
 - .4 Clean units of debris and foreign materials. Remove fins and sharp projections. Prevent debris from entering system.