BLAIR ROAD PUBLIC SCHOOL
PARKING LOT EXPANSION
85 SUNSET BOULEVARD

FOR

WATERLOO REGION DISTRICT SCHOOL BOARD

ISSUED FOR CONSTRUCTION
09 JUNE 2025

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PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS:

.1 The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.

1.02 SCOPE OF WORK:

.1 This specification covers the requirements for demolition, salvage, removal, and in-place abandonment, either completely or partially, of those materials and structures so designated, including the requirements for backfilling resulting in excavations, trenches, holes, and pits.

1.03 GENERAL

.1 Removal, abandonment, demolition, or salvage of a particular item shall be as indicated on the Drawings and herein.

.2 The Work shall include all associated excavation, backfill, compaction, trimming, plugging, capping, filling, sealing, and right-of-way preparation.

1.04 REFERENCES

.1 Ontario Provincial Standard Specification 510 (Construction Specification for Removal)

.2 Section 31 23 00, Excavation, Backfill & Site Grading Specification

1.05 PAYMENT

.1 Payment for the lump sum bid price shall include compensation for all labour, Construction Equipment, and materials required to do the Work specified herein, including all costs for excavations, stockpiling, transporting and disposing of removed items, and for the supply and installation of imported backfill if required.

PART 2 - PRODUCTS

2.01 GENERAL

.1 Refer to the referenced specification sections for Products and materials required to perform restoration Works related to items demolished or removed.

PART 3 - EXECUTION

3.01 EXCAVATION, STOCKPILING AND DISPOSAL

.1 Refer to Specification Section 31 23 00 for requirements for excavation, stockpiling and disposal related to items indicated to be removed.

.2 Excavation required for the Work to be carried out under this specification shall be part of the removal operation and shall be performed in a manner that leaves any portions not designated for removal undisturbed.

.3 All materials indicated to be removed shall be disposed of legally, off-site.

3.02 REMOVAL

.1 Removal shall be performed in a manner and with Construction Equipment that leaves undisturbed any portion not designated for removal or salvage. The broken edges of portions to be left in place that will be visible after construction shall be squared and neatly trimmed.

3.03 TREE ROOT AND LOWER BRANCH PRUNING

.1 The Contractor is to take special precautions for trees indicated on the Drawings that may be adversely affected by the excavation and installation of the Work specified. The Contractor is to hand dig within the drip line of noted trees in order to expose the root systems, then consult with the Consultant on how to proceed. Selective root pruning and relocation should be expected. For root and branch pruning requirements see the Planting Specification – Section 02950. The Contractor is to safeguard and keep moist exposed tree roots until backfilling is complete.

.2 In order to minimize adverse impact on tree root systems, a number of special granular backfill and compaction measures should be expected. As directed by the Consultant, the depth of granular base materials and the degree of compaction may be adjusted in the vicinity of tree trunks and major roots. The Contractor is to avoid direct contact of tree roots with limestone gravel or concrete slurry. The supply and installation of a continuous layer of geo-textile filter cloth should also be expected.

.3 After backfilling excavations with topsoil, apply a slow release nitrogen fertilizer and soak into the root system of the trees with water.

.4 Prune the branches of affected trees to compensate for root loss, as directed by the Consultant.

.5 Prune the lower branches to establish a minimum 1.8 metre vertical clearance under affected trees, as directed by the Consultant.

3.04 OTHER REMOVALS

.1 Remove the existing on-site features, as shown on the Drawings, or as directed by the Consultant.

.2 Remove and dispose of features legally off-site.

.3 Reinstate affected areas to topsoil and sod or as indicated on Drawings.

3.05 BACKFILLING, COMPACTING, AND TRIMMING

.1 Where removal or partial removal requires the filling of a trench, hole, or pit, backfilling shall be to the required grade using either excavated materials approved by the Consultant or imported materials, as required, and shall include levelling and trimming of the site to match required contours and Provide adequate drainage. Backfill material shall be placed according to Section 31 23 00, Excavation, Backfill & Site Grading Specification.

3.06 RESTORATION

.1 Restore the area of any removal operations to match the surrounding area or as otherwise indicated in the Drawings.

.2 Restoration shall be in accordance with relevant Sections of these Specifications for each type of Work.

END OF SECTION

PART 1 - GENERAL

1.1 General Instructions

.1 Read and be governed by Conditions of the Contract and Sections of Division 1.

1.2 Section Includes:

.1 Design, labour, Products, equipment and services necessary for the miscellaneous and metal fabrication Work in accordance with the Contract Documents.See Architectural Drawings and Details

1.3 Quality Assurance

.1 Execute Work of this Section only by a Subcontractors who has adequate plant, equipment, and skilled Workers to perform Work expeditiously, and is known to have been responsible for satisfactory installations similar to that specified during a period of at least the immediate past five years.

1.4 Reference

.1 ASTM A123, Specification for Zinc (Hot Dip Galvanized) Coatings on Iron & Steel Products.

.2 ASTM A153, Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.3 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

.4 ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc- Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.

.5 CAN/CSA-G40.20/G40.21-M, General Requirements for Rolled or Welded Structural Quality Steel/ Structural Quality Steels.

.6 CAN/CSA G164-M, Hot Dip Galvanizing of Irregularly Shaped Articles.

.7 CAN/CSA S16.1-M, Limit States Design of Steel Structures.

.8 CSA S136.1-M, Commentary on CAN/CSA S136-M, Cold Formed Steel Structural Members.

.9 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.

.10 CSA W48, Filler Metal and Allied Materials for Metal Arc Welding.

.11 CSA W59-M, Welded Steel Construction (Metal Arc Welding).

.12 CAN/CSA W117.2-M, Safety in Welding, Cutting and Allied Processes.

.13 CAN/CGSB 1.40-M, Primer, Structural Steel, Oil Alkyd Type.

.14 CGSB 1-GP-181, Organic Zinc Rich Primer.

.15 CGSB 85-GP-16M, Painting Galvanized Steel.

.16 Steel Structures Painting Council (SSPC), Steel Structures Painting Manual, Vol. 2.

1.5 Design Criteria

.1 Work of this Section which functions to resist forces imposed by dead and liveloads shall conform to requirements of jurisdictional authorities.

.2 Design Work of this Section and applicable Shop Drawings shall be carried out by a qualified professional engineer licensed to practice in the Place of Work.

.3 Design details and connections, where not shown on Drawings, in accordance with CAN/CSA-S16.1 and CSA S136.1.

1.6 Shop Drawings

.1 Submit Shop Drawings in accordance with Section 01 33 00.

.2 Clearly indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

.3 Shop Drawings shall be sealed by a qualified professional engineer licensed to designs structures and registered in Place of the Work.

1.7 Delivery. Storage and Handling

.1 Label, tag or otherwise mark Work supplied for installation by other Sections to indicate its function, location in building and shop drawing designation.

.2 Protect Work from damage during delivery, storage and handling

PART 2 - PRODUCTS

2.1 Materials

.1 General:

.1 Unless detailed or specified otherwise, standard Products will be acceptable if construction details and installation meet intent of Drawings and Specifications.

.2 Include materials, Products, accessories, and supplementary parts necessary to complete assembly and installation of Work of this Section.

.3 Incorporate only metals that are free from defects which impair strength or durability, or which are visible. Install only new metals of best quality, and free from rust or waves and buckles, and that are clean, straight, and with sharply defined profiles.

.2 Structural shapes, plates, and similar items: CAN/CSA-G40.20/G40.21-M, Grade 350W. Hollow structural sections: CAN/CSA-G40.20/G40.21-M, Grade 350W, Class H.

.3 Galvanized sheet steel: ASTM A653/A653M Grade A, Z275 Commercial Quality zinc coating, size and shape as shown.

.4 Welding materials: CSA W48 and CSA W59-M.

.5 Fasteners: Conforming to ASTM A307, Grade A, in areas not exposed to view, use unfinished bolts with hexagon heads and nuts. In areas exposed to view, use bolts, nuts, washers, rivets, lock washers, anchor bolts, machine screws and machine bolts Z275 zinc coated in accordance with ASTM A653/A653M. Supply bolts of lengths required to suit thickness of material being joined, but not Projecting more than 6 mm beyond nut, without the use of washers.

.6 Primer paint: CAN/CGSB-1.40-M or CPMA 1.73a.

.7 Galvanized primer paint: Inorganic zinc rich primer. For use on galvanized fabrications where touch up is to remain unpainted in finished Work; Carbozinc 11WB by Carboline Company, Catha-Coat 305 by Devoe Coatings or Zinc Clad XI by Sherwin Williams.

.8 Drilled inserts: Mega by ITW Construction Products or HSL by Hilti Inc. heavy-duty anchors, sizes as shown.

2.2 FABRICATION

.1 Verify dimensions of existing Work before commencing fabrications and report any discrepancies to the Consultant.

.2 Fit and assemble Work in shop where possible. Execute Work in accordance with details and reviewed Shop Drawings.

.3 Use self-tapping shake-proof screws on items requiring assembly by screws or as indicated. Use screws for interior metal Work. Use welded connections for exterior metal Work unless otherwise found acceptable by the Consultant.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush. Seal exterior steel fabrications against corrosion in accordance with CAN/CSA S16.1-M.

.5 Execute shop welding to requirements specified.

.6 Carefully make and fit details. Take special care with exposed finished Work to produce a neat and correct appearance to the Consultant's acceptance.

.7 Assemble members without twists or open joints.

.8 Correctly size holes for connecting Work of other trades where such can be determined prior to fabrication. Where possible, show holes on Shop Drawings. Place holes not to cause appreciable reduction in strength of member.

.9 Draw mechanical joints to hairline tightness and seal countersunk screw and access holes for locking screws with metal filler where these occur on exposed surfaces.

2.3 FABRICATED ITEMS

.1 Provide metal fabrication items indicated below and items not indicated to be supplied under other Sections. The following items includes miscellaneous and metal fabrication including but not limited to the items listed below.

.2 Refer to Drawings for details of metal fabrication Work and related items not specifically listed in this Section.

.3 Where Work is required to be built into Work of other Sections supply such members to respective Sections.

.4 Handrails, guardrails, and posts:

.1 Design railings to withstand minimum horizontal and vertical loads as required to meet requirements of authorities having jurisdiction. In no instance shall load design of railings be less than 2.2 kN/m horizontally and 1.5 kN/m vertically.

.2 Close open ends of steel handrails with 1.9 mm thick closure neatly welded. Fabricate railings, handrails, and guardrails as shown on Drawings.

.5 Miscellaneous steel brackets, supports and angles

.1 Supply and install or supply for installation by trades responsible, all loose steel brackets, supports and angles where indicated, except where such brackets, supports and angles are specified under Work of other Sections. Drill for countersunk screws, expansion anchors and anchor bolts.

.2 Unless otherwise specified, prime paint for interior installation; galvanized finish for exterior installation.

2.4 ANCHORS AND FASTENING

.1 Use weld studs of size not larger than 10 mm for attaching miscellaneous materials and equipment to building steel. If weight of item requires larger fasteners use clips or brackets and secure by welding or through bolting.

.2 Use self drilling expansion type concrete anchors for attaching to masonry and concrete

.3 Use steel beam clamps of two bolt design to transmit load to beam web. Do not use C and I clamps.

2.5 WELDING

.1 Perform welding by electric arc process.

.2 Execute welding to avoid damage or distortion to Work. Execute welding in accordance with following standards:

.1 CSA W48 - for Electrodes. If rods are used, only coated rods are allowed.

.2 CSA W59-M and CSA W59S1-M for design of connections and Workmanship.

.3 CAN/CSA W117.2-M - for safety.

.3 Thoroughly clean welded joints and expose steel for a sufficient distance to perform welding operations. Finish welds smooth. Supply continuous and ground welds which will be exposed to view and finish paint.

.4 Test welds for conformance and remove Work not meeting specified standards and replace to Consultant's acceptance.

2.6 SHOP PAINTING

.1 Clean steel to SSPC SP6 and remove loose mill scale, weld flux and splatter.

.2 Shop prime steel with one coat of primer paint to dry film thickness of 0.07 mm. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 deg C. Paint items under cover and leave under cover until primer is dry. Follow paint manufacturer's recommendations regarding application methods, equipment, temperature, and humidity conditions.

.3 Shop prime galvanized steel in accordance with CGSB 85-GP-16M.

.4 Clean but do not paint surfaces being welded in field.

.5 Do not paint surfaces embedded in concrete, but clean as if they were to be primed.

.6 Do not prime machine finished surfaces, but apply an effective anti-rust compound.

.7 Take precautions to avoid damage to adjacent surfaces.

2.7 HOT DIP GALVANIZING

.1 After fabrication, hot dip galvanize specific miscellaneous steel items as indicated. Plug relief vents air tight. After galvanizing, remove plugs, ream holes to proper size and re-tap threads. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with zinc rich primer in accordance with manufacturer's printed directions.

.2 Hot-dip galvanize members in accordance with CAN/CSA G164-M and requirements of the following ASTM, with minimum coating weights or thicknesses as follows:

.1 Rolled, pressed and forged steel shapes, plates, bars and strips: ASTM A123; average weight of zinc coating per square/metre of actual surface, for 4.8 mm and less thickness members 600 g/m^2 for 6 mm and heavier members 640 g/m^2.

.2 Iron and steel hardware: ASTM A153; minimum weight of zinc coating, in ounces per square foot of surface, in accordance with ASTM A153,Table 1 for the various classes of materials used in the Work.

PART 3 - EXECUTION

3.1 Examination

.1 Take site measurements to ensure that Work is fabricated to fit surrounding construction, around obstructions and Projections in place, or as shown on Drawings, and to suit service locations.

3.2 Installation

.1 Install Work plumb, true, square, straight, level, and accurately and tightly fitted together and to surrounding Work and as required for proper performance.

.2 Include with Work of this Section anchor bolts, high tensile bolts, washers and nuts, expansion bolts, toggles, straps, sleeves, brackets, clips, and other items necessary for secure installation as required by loading and jurisdictional authorities. Weld to CAN/CSA-S16.1-94.

.3 Countersink holes Provided for wood screws where wood is attached to Work of this Section.

.4 Attach Work to interior concrete and masonry with corrosion resistant expansion bolts to support load with a safety factor of three (3).

.5 Attach Work to exterior concrete and masonry with non-shrink epoxy grout to support load with a safety factor of three (3).

.6 Insulate between dissimilar metals or between metal, and masonry or concrete with bituminous paint to prevent electrolytic action.

.7 Grout metal posts, pickets, balusters, and the like, in metal sleeves cast into concrete, with non-shrink quick setting epoxy anchor cement, unless detailed otherwise. Fabricate sleeves of 75 mm (3") minimum depth.

.8 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

3.3 Field Painting

.1 Paint bolt heads, washers, nuts, field welds and previously unpainted items. Touch up shop primer damaged during transit and installation, with primer to match shop primer.

3.4 Adjustment and Cleaning

.1 Remove damaged, dented, defaced, defectively finished, or tool marked components and replace with new.

3.5 Protection

.1 Maintain protection of Work of this Section from time of installation until final finishes are applied or to final cleanup.

.2 Protect prime and finish painted and galvanized surfaces from damage.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS:

.1 The conditions of the Contract Division 1 apply to this section in full, as if repeated herein.

.2 All depths of materials indicated on the drawings and in these specifications refer to minimum required depth of materials, after compacting.

1.2 SCOPE OF WORK:

.1 Excavation, backfill and site grading for this Work includes but is not necessarily limited to the following:

1. Stripping and disposal off-site of native topsoil that is surplus or has been indicated by the Consultant to be undesirable.

.2 All required excavation.

.3 Stockpiling and reuse of on-site fill material approved by the Consultant.

.4 Disposal off-site of cut material that is surplus or has been indicated by the Consultant to be undesirable.

.5 Supplying imported topsoil and granular materials as well as trucking them to the site.

.6 Filling, backfilling and compacting granular materials, amended native topsoil or imported topsoil to attain indicated final grades.

1.3 SOURCE OF FILL:

.1 The Consultant must approve the soils and granular materials for use. If testing is required, it is to be paid for by the Contractor.

1.4 DISPOSAL OF EXCAVATED MATERIALS:

.1 All excavated sub-grade material generated by construction, may be used as fill on-site unless otherwise rejected by the Consultant, in which case it is to be disposed of legally off-site at a location determined and paid for by the Contractor.

.2 All surplus sub-grade material generated by construction and not required to attain indicated final grades is to be disposed of legally off-site at a location determined and paid for by the Contractor.

.3 Refer to Geotechnical Report for results of toxicity characteristic leaching procedure analysis. Any additional required testing of excavated material to be disposed of off-site shall be arranged and paid for by the Contractor.

1.5 INSPECTIONS AND TESTING:

.1 The Contractor shall engage a third party testing and inspections consultant satisfactory to the Owner for the testing/inspections outlined below. Cost for testing/inspections consultant shall be paid for from the project cash allowance.

.2 The Contractor shall provide washed sieve gradation analysis for all aggregates and granular materials to be used in accordance with MTO Laboratory Testing Manual Section LS-602 and related standards.

.3 The Contractor shall carry out field inspections and compaction testing of all compacted sub-grade and base materials in accordance with MTO Laboratory Testing Manual Section LS-623 and related standards.

.4 The Contractor shall maintain a record showing the location and result of inspections and testing conducted. These records shall be submitted to the Consultant when requested, or prior to proceeding with work that depends upon the work of this Section.

PART 2 - PRODUCTS

2.01 SOIL, GRANULAR & BACKFILL MATERIALS:

.1 Granular 'A' and 'B': All structural backfill material shall be manufactured granular crushed from limestone rock, described as Granular 'A' and Granular 'B', conforming to the requirements of Ontario Provincial Standard Specification OPSS 1010, "Material Specifications for Aggregates - Granular A, B, M and Select Subgrade Material". **Reclaimed concrete material (RCM) is <u>not</u> acceptable.**

.2 19mm (or 20mm) crushed stone ("crusher run") shall be clean, durable, angular crushed gravel or stone conforming to the following limits:

Sieve Designation	% Passing
19.0mm	100%
4.75mm	40-80%
2.36mm	27-65%
600µm	12-35%

.3 19mm (or 20mm) clear stone shall be clean, durable, angular crushed gravel or stone conforming to the following limits:

Sieve Designation	% Passing
19.0mm	100%
4.75mm	2%

.4 Fill Material: Selected material from excavation or other sources, approved by the Consultant for use intended, unfrozen and free from rocks larger than 75mm, cinders, ashes, sods, refuse, contaminants or other deleterious materials.

2.02 OTHER MATERIALS:

.1 All other materials not specifically described but required for a complete and proper installation, shall be selected by the Contractor, subject to the review of the Consultant.

.2 Geotextile: Terrafix 270R or equal.

PART 3 - EXECUTION

3.01 REMOVAL OF TOPSOIL:

.1 Remove all topsoil from areas to be excavated or regraded. Strip topsoil when it is dry enough to prevent contamination with sub-grade material.

.2 Do not handle topsoil in wet or frozen condition.

.3 Stockpile any available topsoil on-site where directed. Piles shall not exceed 2000mm in height.

3.02 EXCAVATION:

.1 Provide, install and maintain adequate fences and barricades.

.2 Excavate to lines, grades, elevations and dimensions indicated on the Drawings.

.3 Remove concrete, masonry, rubble and other obstructions encountered during excavation and dispose of legally off-site.

.4 Excavation required within proximity of underground utility lines or within the dripline of trees designated to remain are to be made by hand.

.5 Excavation must not interfere with normal 45° plane of bearing from the bottom of any footing.

.6 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic material.

3.03 DEWATERING:

.1 Keep excavations free of water while Work is in progress.

.2 Avoid excavation below groundwater table if quick condition or heave is likely to occur. Prevent piping or bottom heave of excavations by groundwater lowering, or other means.

.3 Protect open excavations against flooding and damage due to surface run-off.

.4 Dispose of accumulated water in a manner not detrimental to public and private property, or any portion of Work completed or under construction.

.5 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers.

3.04 OVER-EXCAVATION:

.1 Where excavations are made below the indicated intended elevations, backfill with lean concrete, unshrinkable fill, crushed stone or granular material as directed by the Consultant. Compact to provide a firm, unyielding sub-grade at no additional cost to the Owner.

3.05 BACKFILL:

.1 Do not place, spread or compact any backfill materials during unfavourable weather. Unfavourable weather includes temperatures below 0°C and/or precipitation.

.2 Do not commence any backfill operation without adequate compaction equipment.

.3 Protect the site of the backfilling and storage of backfill materials from freezing.

.4 Prior to placing backfill, scarify the sub-grade surface to a depth of 50mm.

3.06 COMPACTION:

.1 All layers of backfill material shall be compacted to not less than the minimum density specified. The Contractor is not to proceed until approval of compaction has been granted.

.1 Refer to Pavement Design section of Geotechnical report and City of Toronto Pavement Structural Design Guidelines for specific compaction requirements.

3.07 STORAGE AND STOCKPILING OF MATERIALS:

.1 Stockpiled and imported materials to be stored away from existing trees, drainage areas and access points.

3.08 SITE GRADING:

.1 Perform all rough and finish grading and backfilling required to achieve the finished elevations indicated on the Drawings.

.2 Ensure that the finished ground slopes are as indicated on the Drawings.

.3 Regrade all areas that retain or pond water.

.4 All areas shall be rough graded within a tolerance of plus or minus 50mm.

END OF SECTION

PART 1 – GENERAL

1.1 General Instructions

.1 Read and be governed by Conditions of the Contract and Sections of Division 1.

1.3 Quality Assurance

.1 Subcontractors qualifications:

.1 Paving Work shall be done only by skilled Workers, with suitable machinery, supervised by foremen experienced in type of Work specified.

.2 Execute the Work of this Section by a Subcontractors who has equipment adequate for Project, and skilled Workers so that Work is performed expeditiously; and is known to have been responsible for satisfactory installations similar to that specified.

.3 Materials and mixes that vary to a minor degree from those specified in this Section will be acceptable if they are based on standards of the engineering department of a jurisdiction having authority at the location of the Project and which are approved.

.2 Perform Work on public property in accordance with design and material requirements of applicable local authorities which are imposed in addition to requirements specified in this Section.

.3 Comply with requirements of Ontario Provincial Standard Specifications (OPSS) 310 and 1150.

1.4 Delivery, Storage and Handling

.1 Commence placing and perform compaction of granular base courses only when subgrade temperature is at least 2°C and rising.

.2 Commence laying of asphalt binder courses only when base surfaces are at least 2°C, and the temperature is rising.

.3 Commence laying of asphalt surface courses only when binder course surfaces are completely dry, at least 7°C and the temperature rising.

.4 Suspend paving operations if temperature drops below specified minimums.

1.5 Submittals

.1 A copy of the batch ticket from the asphalt plant shall be supplied certifying that aggregate and asphalt meet specifications and record the weight of each load.

1.6 Warranty

.1 Provide a labour, material and Workmanship warranty against defects such as ponding, cracking in surfaces, excess settlement areas, for a period of two (2) years.

PART 2 – PRODUCTS

2.1 Granular Base and Sub Base

.1 As per Specification 31 23 00

2.2 Asphaltic Material

.1 Asphaltic Material HL3A as conforming to the requirements of Ontario Provincial Standard Specification OPSS 1150.

2.3 Pavement Composition

Pavement Layer	Minimum Thickness	Compaction Requirements
Surface	40 mm SP9.5 (HL-3 Fine)	OPSS 310 (TS -310)
Binder	135 mm SP19.0 D (HL-8)	OPSS 310 (TS-310)
Granular Base	150 mm Granular A (TS 1010)	100% SPMDD (ASTM D-698)
Granular Subbase	150 mm Granular B Type II (TS 1010)	100% SPMDD (ASTM D-698)
Total	475mm	

PART 3 – EXECUTION

3.01 INSTALLATION:

.1 All work shall conform to OPSS and Details.

.2 The Contractor is to ensure that the sub-grade has been approved by the Consultant prior to placing granular materials.

.3 Lay granular base parallel to the final grade and compact to 98% Standard Proctor Density. Ensure there are no dips or uneven slopes. Ensure all areas are sloped to drain. Granular base to extend 150mm beyond edge of asphalt.

.4 All asphalt edges not contained by hard edges shall have uniform lines with a hand tamped 45° angle. All pathway edges shall have a “smooth”, curvilinear appearance. The Consultant reserves the right to request that sections of pathway be reworked to achieve the desired appearance.

.5 Exercise care to prevent contamination of materials.

3.02 MAINTENANCE:

.1 Maintain all asphalt up until the date of acceptance by the Owner.

.2 Maintenance shall include all repair work necessary to keep asphalt paving at required grades and to keep surface clean and intact until final acceptance.

.3 The Contractor shall keep all pathways clean and clear of any mud tracks or other debris both on and off the site.

3.03 Field Quality Control

.1 An inspection and testing company will be selected to verify that compaction of granular base courses conform to specified requirements.

.2 Payment for inspection and testing will be by cash allowance.

3.04 Adjustment and Cleaning

.1 Replace defective asphalt pavements with patches cut into pavement, in rectangular areas, and with joints made as specified.

END OF SECTION

PART 1 • GENERAL

1.01 Description

.1 The work covered by this section includes the furnishing of all labour, materials, equipment, and incidentals for the design, inspection, and construction of a modular concrete Segmental Retaining Wall ("SRW") including drainage system and geosynthetic reinforcement as shown in the Construction Documents and as described by this Specification. The work included in this section consists of, but is not limited, to the following:

.1 Design of an SRW system.

.2 Review of the site conditions with respect to suitability of the SRW Design.

.3 Inspection of all construction operations and materials related to the SRW.

.4 Excavation and foundation soil preparation.

.5 Furnishing and placement of the Leveling Base.

.6 Furnishing and placement of the Drainage system.

.7 Furnishing and placement of Geotextile Filter.

.8 Furnishing and placement of SRW units.

.9 Furnishing and placement of Geosynthetic Reinforcement.

.10 Furnishing, placement, and compaction of Reinforced, Drainage, and Retained Fills.

.11 Furnishing of final grading.

1.02 Reference Standards

.1 Segmental Retaining Wall Design

.1 Design Manual for Segmental Retaining Walls, National Concrete Masonry Association, Second Edition which will be referred to as the "NCMA Design Manual"

.2 Segmental Retaining Wall Units

.1 ASTM C140-06, "Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units"

.2 ASTM C1262-05a, "Standard Test Method for Evaluating the Freeze-Thaw Durability of Manufactured Concrete Masonry Units and Related Concrete Units"

.3 ASTM C1372-2006e1, "Standard Specification for Dry-Cast Segmental Retaining Wall Units"

.4 ASTM D6638-06, "Test Method for Determining Connection Strength Between Geosynthetic Reinforcement and Segmental Concrete Units (Modular Concrete Blocks)"

.5 ASTM D6916-06c, "Standard Test Method for Determining the Shear Strength Between Segmental Concrete Units (Modular Concrete Blocks)"

.3 Geotextile Filter

.1 ASTM D4491-99a(2004)e1, "Standard Test Methods for Water Permeability of Geotextiles by Permittivity"

.2 ASTM D4751-04, "Standard Test Method for Determining Apparent Opening Size of a Geotextile"

.3 ASTM D5261-92(2003), "Standard Test Method for Measuring Mass per Unit Area of Geotextiles"

.4 Geosynthetic Reinforcement

.1 ASTM D5262-06, "Standard Test Method for Evaluating the Unconfined Tension Creep Rupture Behavior of Geosynthetics"

.2 ASTM D6637-01, "Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method"

.3 ASTM D6706-01, “Standard Test Method for Measuring Geosynthetic Pullout Resistance in Soil”

.5 Soils

.1 ASTM D422-63(2002)e1, “Standard Test Method for Particle-Size Analysis of Soils”

.2 ASTM D698-00ae1, “Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft -lbf/ft 3 (600 kN-m/m3))”

.3 ASTM D2487-06 “Standard Practice for Classification of Soils for Engineering Purposes (Unifi ed Soil Classification System)”

.4 ASTM D4318-05, “Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils”

.5 ASTM D4972-01, “Standard Test Method for pH of Soils”

.6 Drainage Pipe

1) ASTM D3034-06, “Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings”

2) ASTM F405-05, “Standard Specification for Corrugated Polyethylene (PE) Pipe and Fittings”

.7 Where specifications and reference documents conflict, the Consultant shall make the final determination of applicable document.

1.03 Delivery, Material Handling, and Storage

.1 The Installer shall check all materials delivered to the site to ensure that the materials specified in the Construction Documents have been received and are in good condition.

.2 The Installer shall store and handle all materials in accordance with manufacturer’s recommendations and in a manner to prevent deterioration or damage due to moisture, temperature changes, contaminants, handling, or other causes.

1.04 Segmental Retaining Wall Design and Construction

.1 The design and construction of the Segmental Retaining Wall shall be undertaken by the following three entities:

.1 The term Installer shall refer to the individual or firm that will construct the SRW. The Installer must have the necessary experience and understanding of SRWs for the project and have successfully completed projects of similar scope and size.

.2 The term General Review Engineer refers to the professional engineer, licensed to practice in Ontario, who shall be retained by the Installer to provide the following services:

.1 Inform the Designer in writing that they will be acting as the General Review Engineer for the project prior to construction.

.2 Evaluate the site conditions to ensure the parameters used in the SRW Design are appropriate. SRW Design parameters that have assumed values must be verified to be accurate for the site.

.3 Determine if the SRW Design requires additional analysis, with respect to compound stability and global stability.

.4 Testing and acceptance of all materials used to construct the SRW.

.5 Inspection of the methods used to construct the SRW.

.6 Determine if the wall is constructed in general conformance with the Construction Documents.

.3 The term Designer refers to the professional engineer, licensed to practice in Ontario, who shall be retained by the Installer and responsible for generating a sealed SRW Design based on information that is provided to the Designer, created in accordance with Section 3.01.

1.05 Submittals

.1 Submit shop drawings in accordance with Section 01 33 00, signed and sealed by an engineer licensed to practice in Ontario.

.2 Submit samples of segmental retaining wall units demonstrating colour, texture and unit dimensions.

PART 2 - MATERIALS

2.01 Definitions

.1 Segmental Retaining Wall ("SRW") is the entire retaining wall structure(s) including: SRW Units, Coping, Drainage Pipe, Geotextile Filter, Geosynthetic Reinforcement and Drainage, Reinforced, Retained, and Base Fills.

.2 Segmental Retaining Wall Units are modular, solid, dry-cast concrete blocks, designed specifically for the task of earth retention, that form the external facia of an SRW system.

.3 Coping Units are the last course of concrete units used to finish the top of the SRW. Coping Units are also referred to as cap units.

.4 Leveling Base is the compacted granular soil, or if specified, an unreinforced concrete footing, placed beneath the first course of SRW units.

.5 Drainage Fill is a free draining aggregate with high permeability placed directly behind the modular concrete units. This will include a Drainage Pipe and may be separated from other Fill with a suitable Geotextile Filter.

.6 Reinforced Fill is placed directly behind the Drainage Fill, placed in layers and compacted, that will include horizontal layers of Geosynthetic Reinforcement.

.7 Retained Fill is the soil placed between the Reinforced Fill and the Retained Soil in Reinforced SRWs or between the Drainage Fill and Retained Soil in Conventional SRWs.

.8 Retained Soil in cut situations is the undisturbed native soil embankment. In soil fill situations this will be the compacted engineered site fill.

.9 Foundation Soil is the undisturbed native soil or engineered fill beneath the SRW structure.

.10 Drainage Pipe is a perforated pipe used to carry water, collected from within the SRW, to outlets, to prevent pore water pressures from building up within the SRW and specifically behind the SRW Units.

.11 Geotextile Filter is a permeable planar polymer structure that will allow the passage of water from one soil medium to another while preventing the migration of fi ne particles that might clog the downstream fi ll. Selection of a Geotextile Filter is based on the characteristics of the different soils used in and surrounding the SRW.

.12 Geosynthetic Reinforcement is an open planar polymer structure having tensile strength and durability properties that are suitable for soil reinforcement applications. Geogrid is a commonly used type of Geosynthetic Reinforcement.

2.02 Materials

.1 Basis of SRW design: PisaSmooth retaining wall by RisiStone

.2 The SRW units must:

.1 Meet the minimum standard as defined by ASTM C1372 for: Strength, Absorption. Freeze - Thaw durability, Permissible variation in dimensions, Finish and Appearance

.2 Meet the physical properties listed below as tested using ASTM C140:

.1 Dimensional tolerance shall be +/- 3 mm (1/8 in.) for height, width, and length.

.2 The minimum 28-day compressive strength of 35 MPa (5000 psi).

.3 The maximum moisture absorption shall be 1.0 kN/cubic m (6.5 lbs/cubic ft).

.3 Use an integral shear key connection that shall be off set to create a near vertical alignment.

.4 If required, summary test data shall be provided with the SRW Design and shall include:

.1 SRW Unit shear strength as per ASTM D6916

.2 SRW Unit - Geosynthetic Reinforcement connection strength as per ASTM D6638

.3 Reinforced Fill

.1 If the SRW Units by themselves provide sufficient stability, the Designer may choose to omit the Reinforced Fill

.2 The Reinforced Fill shall be “select imported fill”

.1 Unified Soil Classification System designation as per ASTM D2487

.2 % passing #200 sieve

.3 Effective friction angle (direct shear or triaxial test)

.4 Minimum compacted density

.3 Additional information may be required which could include:

.1 Soil gradation curve (ASTM D422)

.2 Liquid limit, plastic limit, and plasticity index (ASTM D4318)

.3 Soil pH (ASTM D4972)

.4 Permeability coefficient “Q”

.4 Leveling Base

.1 The leveling base material shall be non-frost susceptible, well-graded, compacted angular gravel-sand mixture (GW as per ASTM D2487).

.2 Additional information may be required which could include:

.1 Effective friction angle (direct shear or triaxial)

.2 Soil gradation curve (ASTM D422)

.3 Soil pH (ASTM D4972)

.4 Permeability coefficient “Q”

.5 Potential for consolidation

.3 Alternately, if required by the Designer, a leveling base consisting of an unreinforced concrete footing with specified dimensions.

.5 Drainage Fill

.1 If the Reinforced Fill has adequate drainage characteristics, the Designer may choose to omit the Drainage Fill.

.2 The Drainage Fill shall be a free-draining angular, gravel material of uniform particle size smaller than 25 mm (1 inch) and greater than 6mm (1/4 inch). If shown in the Construction Documents, the Drainage Fill shall be separated from the Reinforced Fill or Retained Fill by a specified Geotextile Filter.

.3 Additional information may be required which could include:

.1 Effective friction angle (direct shear or triaxial)

.2 Soil gradation curve (ASTM D422)

.3 Soil pH (ASTM D4972)

.4 Permeability coefficient “Q”

.5 Potential for consolidation

.4 Drainage Pipe

.1 The Drainage Pipe shall either be a perforated corrugated polyethylene or perforated PVC pipe, with a minimum diameter of 100 mm (4 inches), protected by a Geotextile Filter to prevent the migration of soil particles into the Drainage Pipe.

.5 Geotextile Filter

.1 Non-woven needle-punched geotextile that will have an Apparent Opening Size ranging between 0.149 and 0.212 mm (U.S. Sieve Sizes #100 to #70) and a minimum unit weight of 135 grams per square metre (5.0 oz per square yard). The coefficient of permeability will typically range between 0.1 and 0.3 cm/second.

.6 Geosynthetic Reinforcement

.1 If the SRW Units by themselves provide sufficient stability, the Designer may choose to omit the Geosynthetic Reinforcement.

.2 The Geosynthetic Reinforcement shall be specified in the Construction Documents and shall include the manufacturer's name, product name, and Long Term Design Strength ("LTDS") as calculated according to section 3.01.A.5.

.3 If required, summary test data shall be provided with the SRW Design and shall include:

.1 Tensile strength (ASTM D6637)

.2 Creep potential reduction factor (ASTM D5262)

.3 Installation damage reduction factor

.4 Durability reduction factor (chemical and biological)

.5 Soil pullout resistance (ASTM D6706)

.6 Connection strength (ASTM D6638)

.7 Coefficient of interaction "ci"

.8 Coefficient of interaction "cds"

.7 Concrete Adhesive

.1 If the Coping Unit by itself provides sufficient stability, the Designer may choose to omit the Coping Adhesive.

.2 The adhesive is used to permanently secure the coping unit to the top course of the SRW. The adhesive must provide sufficient strength and remain flexible for the expected life of the SRW.

PART 3 - EXECUTION

3.01 Segmental Retaining Wall Design

.1 Design Standard

.1 The Designer is responsible for providing an SRW Design based on the proposed site development documents and shall consider the external stability, internal stability, and local stability of the SRW system. The design life of the structure shall be 75 years.

.2 The Designer shall create the SRW Design in accordance with recommendations of the NCMA Design Manual. The following is a summary of the minimum factors of safety for the various modes of failure evaluated in the proposed design.

External Mode	Minimum	Internal Mode	Minimum	Local Mode	Minimum
Base Sliding	1.5	Tensile Overstress	1.0	Facing Shear	1.5
Overturning	2.0	Pullout	1.5	Connection	1.5
Bearing Capacity	2.0	Internal Sliding	1.5	Unreinforced Overturning	1.5

.3 If required, an alternate design method may be used and must be identified in the SRW Design. The alternate design method must be comprehensive and adequately evaluate all possible modes of failure.

.4 The lateral earth pressure which the SRW must resist is calculated using the Coulomb equation which will include the effect of a sloping surface above the SRW. This defines a theoretical critical linear slip failure plane external to the SRW structure and another internal to the SRW structure. Additionally the SRW must have the room to move forward so that it may fully develop an active lateral earth pressure.

.5 The SRW's design height, "H", at a given section, shall be measured from the top of the Leveling Base to the top of the SRW where ground surface intercepts the SRW facia.

.2 Design Assumptions

.1 The SRW Design shall assume the following and be noted on the SRW Design drawings:

.1 The foundation soils will produce acceptable total and differential settlement given the applied load of the SRW.

.2 The maximum groundwater elevation is at least 2/3 x H (height) below the base of the SRW.

.3 There will be no hydrostatic pressure within or behind the SRW.

.4 The surrounding structures will not exert any additional loading on the SRW (i.e. an adjacent structural foundation is at or below proposed Leveling Base or outside of a theoretical zone of influence as determined by the General Review Engineer).

.3 Design Parameters

.1 Site Parameters

.1 The length, height, and overall elevations of the SRW Design must be derived from the provided site grading plan, elevation details, cross-section details, and station information.

.2 Surcharges, anticipated usage and slopes above, as well as slopes below, all sections of the SRW must be indicated on the site grading plan.

.3 The minimum SRW embedment shall be the greater of:

.1 The height of an SRW unit, or

.2 The minimum embedment required based on the slope below the SRW.

Slope Below SRW	**Minimum Embedment**
No slope	H/10
3:1	H/10
2:1	H/7

.3 The Designer or General Review Engineer may determine it is necessary to increase embedment due to erosion potential or global stability requirements.

.2 Site Soil Parameters

.1 All site soil parameters used in the design shall be stated in the SRW Design. This should include soil classification (ASTM D2487), effective friction angle, compacted density, and cohesion.

.2 Site-specific soil parameters obtained from site geotechnical investigations shall be used in the design calculations. If a site geotechnical investigation is not available or does not provide specific parameters for the SRW, assumed soil parameters may be used and the SRW Design shall state the assumed values and that assumed soil parameters have been used.

.3 If select on-site soils are to be used as SRW fill materials, additional testing of the re-compacted soil will be required for the design calculations. Soil parameters for the select on-site fill shall be used in the design calculations. If fill parameters are not

available, assumed fill parameters may be used and the Design Drawings shall state the assumed values and that assumed fill parameters have been used.

.3 Product Design Parameters

.1 All relevant Product Design Parameters for materials incorporated in the SRW shall be obtained from the supplier or manufacturer and used in the design calculations. All values used shall be obtained from testing conducted in accordance with the Reference Standards identified in Section 1.03. If product test results are not available, assumed parameters may be used and the Design Drawings shall state the assumed values and that assumed product design parameters have been used.

3.02 Segmental Retaining Wall Design Review

.1 The General Review Engineer will need to

.1 Review the SRW Design to ensure:

.1 The design assumptions are not contrary to the conditions on the site.

.2 The site geometric parameters used in the SRW Design are appropriate for the site.

.3 The site soil parameters used in the SRW Design are appropriate for the soil conditions on the site.

.4 The foundation soils will not require special treatment to control total and differential settlement.

.5 The fill parameters used in the SRW Design are appropriate for the materials to be used in the construction of the SRW.

.6 The SRW Design complies with local building and health and safety regulations.

.2 The General Review Engineer is responsible for ensuring the global stability of the SRW structure including circular slip failure and multi-part slip failure planes that are completely external or partially external (also called compound failure mechanisms) to the SRW structure is adequately investigated.

.3 The General Review Engineer must contact the Designer to address any outstanding issues, questions, or concerns regarding the SRW Design and resolve these issues prior to issuing Construction Documents or authorize the SRW Design to be used as Construction Documents.

.3 After the review of the SRW Design is completed by all associated parties and all issues are resolved by revisions to the SRW Design, the General Review Engineer will issue sealed Construction Documents based on the SRW Design or authorize the SRW Design to be used as the Construction Documents.

3.03 Inspection

.1 Testing and inspection services shall be performed by trained and experienced technicians currently qualified for the work to be performed.

.2 The Owner may engage a testing and inspection agency for their own quality assurance, but this does not replace the General Review Engineer’s inspection function described below.

.3 General Review Engineer’s Inspection

.1 The General Review Engineer shall ensure that the site conditions are in general conformance with those stated in the SRW Design.

.2 The General Review Engineer shall ensure that the SRW is constructed in accordance with the Construction Documents.

.3 The General Review Engineer shall inform the Designer in writing if conditions on site differ in any way or at any time from the Construction Documents. The Designer is to be consulted with regard to all discrepancies between the Construction Documents and actual site conditions to determine how the differences affect the SRW Design. Changes in conditions on site may include, but are not limited to:

.1 Seepage from the excavation, or

.2 Higher than assumed groundwater elevations,

.3 Soil conditions, both in situ and/or engineered,

.4 Surface drainage control on the site require measures greater than those specified,

.5 Site required SRW geometry (heights, alignment, lengths, etc.),

.6 Structures exist not shown in the Construction Documents that apply load to, interfere with, or are influenced by the SRW (catch basins, light standards, buildings, fences, etc.),

.7 Loading conditions (i.e. roadways or pathways closer to back of SRW than originally assumed),

.8 Slopes above or below the SRW that are steeper.

.4 General Review of Construction Procedures:

.1 The General Review of Construction must be carried out in accordance with the guidelines set out by the governing professional engineering body. The purpose of the general review is to ensure, through periodic visits on a rational sampling basis, whether the work is in general conformity with the Construction Documents.

.2 Prior to construction the General Review Engineer should identify critical stages in the construction of the SRW at which the General Review Engineer must be present to observe and inspect the work. The General Review Engineer must be given sufficient notice prior to these events to ensure they will be on site.

.3 During construction the General Review Engineer should verify and continually monitor the following:

.1 Ensure materials and fill are of the type and strength specified and they are placed as specified in the Construction Documents.

.2 Identify loose or unsuitable foundation or retained soils and subsequent removal and replacement of these areas.

.3 Ensure the other structural elements of the SRW, including Geosynthetic Reinforcements and SRW Units, are being installed in accordance with the Construction Documents.

.4 Ensure the SRW and associated excavation remains outside of the loading influence of other adjacent structures, unless they have been specifically accounted for in the SRW Design and shown in the Construction Documents.

.5 Ensure stability of excavations and conformance with applicable regulations.

.6 Ensure groundwater conditions and/or other water sources have been identified and compared with the assumptions made in the design. Additional water sources noted on site such as seepage from the cut embankment must be identified and the Designer notified if these are not noted in the Construction Documents.

.7 Ensure that surface water runoff and/or other sources of water are being controlled during construction and directed away from the SRW to a functioning drain.

.8 Ensure that all fill materials are adequately protected from the elements and frozen materials or materials that do not meet the moisture content requirements stated in the Construction Documents are not used in the construction of the SRW.

.5 The General Review Engineer shall submit written reports of inspections and material testing to the Installer on a weekly basis, or more frequently, as agreed with the Installer. Such reports shall include description of the work observed, deficiencies noted in construction, and corrective action taken to resolve such deficiencies. Reports must make specific reference to the location, type, and results of all tests taken on the project.

.6 At the completion of construction, the General Review Engineer shall provide a Letter of General Review to the Installer stating the completed SRW had been installed in general conformity with the Construction Documents.

.4 Installer's Quality Assurance Program

.1 The Installer is responsible to ensure the SRW is constructed in accordance with the Construction Documents. The Installer must be qualified in the construction of SRWs, knowledgeable of acceptable methods of construction, and have thoroughly reviewed and understood the Construction Documents.

.2 The Installer shall keep a construction journal to document the construction of the SRW as part of a thorough quality control program. The General Review Engineer shall be provided with copies of the construction journal throughout the construction process.

.3 The Installer's fi eld construction supervisor shall have demonstrated experience and be qualified to direct all work related to the SRW construction.

.4 The Installer must notify the General Review Engineer of critical stages in the construction of the SRW in order that they may be present to observe and inspect the work. The General Review Engineer must be notified reasonably well in advance of the scheduled date(s) for construction.

3.04 Construction

.1 Site Preparation

.1 Comply with all current local regulations for execution of the work, including local building codes and excavation regulations. Provide excavation support as required to maintain stability of the area during excavation and SRW construction and to protect existing structures, utilities, landscape features, property, or improvements.

.2 Prior to grading or excavation of the site, confirm the location of the SRW and all underground features, including utility locations within the area of construction. Ensure surrounding structures are protected from effects of SRW excavation.

.3 Coordinate installation of underground utilities with SRW installation.

.4 Control surface water drainage and prevent inundation of the SRW construction area during the construction process.

.5 The Foundation Soil shall be excavated or filled as required to the grades and dimensions shown in the Construction Documents.

.6 The Foundation Soil shall be proof rolled and examined by the General Review Engineer to ensure that it meets the minimum strength requirements specified in the Construction Documents. If unacceptable Foundation Soil is encountered, the General Review Engineer should contact the Designer to discuss options and determine the most appropriate course of action.

.7 In cut situations, the native soil shall be excavated to the lines and grades shown in the Construction Documents and removed from the site or stockpiled for reuse as Reinforced or Retained Fill as identified in the Construction Documents. Care should be taken not to contaminate or overly saturate the stockpiled fill material.

.2 Installing Drainage System

.1 Geotextile Filter shall be set against the back of the first SRW Unit, over the prepared foundation soil extending towards the back of the excavation, up the excavation face and eventually over the top of the Drainage Fill to the back of the SRW Units near the top of the wall or as detailed. Geotextile overlaps shall be a minimum of 300 mm (1 ft .) and shall be shingled down the face of the excavation in order to prevent the migration of particles from one fill type to another.

.2 The Drainage Pipe shall be placed in accordance with the overall drainage plan for the site. The main collection drain pipe shall be a minimum of 100mm (4 inches) in diameter. The pipe shall be laid to ensure gravity fl ow of water from the Reinforced Fill. Connect drainage collection pipe at a storm sewer catch basin or daylight along slope at an elevation lower than lowest point of pipe within Reinforced Fill mass, every 15 m (50 feet) maximum.

.3 Leveling Base or Spread Footing Placement

.1 The Leveling Base shall be the specified material placed in the location to the dimensions shown in the Construction Documents.

.4 Installation of Segmental Retaining Wall Units

.1 The bottom row of SRW Units shall be placed on the Leveling Base as shown in the Construction Documents. The units shall be placed in the middle of the Leveling Base. Care shall be taken to ensure that the SRW Units are aligned properly, leveled from side to side and front to back, and are in complete contact with the Leveling Base.

.2 The SRW Units above the bottom course shall be placed to interconnect the shear key and then pushed forward, creating the specified batter of the SRW face.

.3 The SRW Units shall be swept clean before placing additional courses to ensure that no dirt, concrete, or other foreign materials become lodged between successive lift s of the SRW Units.

.4 Successive courses shall be placed to create a running bond pattern with the edge of all units being approximately aligned with the middle of the unit in the course below it. Cut SRW Units may need to be placed to ensure the vertical line between adjacent SRW Units remains within the middle third of the SRW Unit below.

.5 A maximum of three courses of SRW units can be placed above the level of the Reinforced Fill at any time.

.6 The Installer shall check the level of SRW Units with each lift to ensure that no gaps are formed between successive lift s that may affect the performance of the SRW.

.7 Care shall be taken to ensure that the SRW Units and Geosynthetic Reinforcement, where applicable, are not damaged during handling and placement.

.8 No heavy equipment, for compaction, fill placement or other, shall be allowed within 1 metre (3 ft.) of the back of the SRW Units.

.5 Drainage Fill

.1 Drainage Fill to be placed behind the SRW Units with a minimum width of 300 mm (1 ft .) and separated from other soils using the specified Geotextile Filter.

.2 Drainage Fill shall be placed behind the SRW facing in maximum lift s of 150 mm (6 inches) and compacted to a minimum density of 95% Standard Proctor.

.6 Reinforced Fill

.1 Reinforced Fill shall be placed behind the SRW Units or Drainage Fill with a maximum lift thickness of 150 mm (6 inches) and compacted to a minimum density of 95% Standard Proctor Maximum Dry Density (ASTM D698) at a moisture content from 2% below to 2% above optimum.

.2 The Reinforced Fill shall be placed and compacted level with the top of the SRW Units at the specified Geosynthetic Reinforcement elevations to ensure no voids exist under the Geosynthetic Reinforcement as it extends out over the Reinforced Fill.

.3 Care shall be taken to ensure that the Geosynthetic Reinforcement lays flat and taut during placement of the Reinforced Fill. This is best achieved by placing the Reinforced Fill on top of the Geosynthetic Reinforcement near the SRW facia and spreading toward the back of the Reinforced Fill.

.4 At the end of each day’s operation, slope the last lift of Reinforced Fill away from the SRW facing to rapidly direct runoff away from the SRW facia. Do not allow surface runoff from adjacent areas to enter the SRW construction area.

.7 Geosynthetic Reinforcement

.1 Cut Geosynthetic Reinforcement in sheets to the length as detailed.

.2 Geosynthetic Reinforcement sheets shall be placed horizontally with the primary strength direction perpendicular to the SRW face, at the elevations shown in the Construction Documents. The sheets are to be placed adjacent to one another, without overlapping and without gaps between them.

.3 Sweep the top of the SRW Units to ensure the SRW Units are clean and free of debris.

.4 The Geosynthetic Reinforcement shall be placed over the compacted Reinforced Fill and the SRW Units with the outside edge extending over the shear key of the SRW Unit to within 25 mm (1 in.) of the front facing unit.

.5 The next course of SRW Units shall be carefully placed on top of the lower course to ensure that no pieces of concrete are chipped off and become lodged between courses and the Geosynthetic Reinforcement is in complete contact with the top and bottom surfaces of the successive SRW courses.

.6 With the Geosynthetic Reinforcement secured in place, the Geosynthetic Reinforcement shall be pulled taut away from the back the SRW Units during placement of Reinforced Fill. Alternatively, suitable anchoring pins or staples can be used to ensure that there are no wrinkles or slackness prior to placement of the Reinforced Fill. The Geosynthetic Reinforcement shall lay flat when pulled back perpendicular to the back of the SRW facia.

.7 No construction equipment shall be allowed to operate directly on top of the Geosynthetic Reinforcement until a minimum thickness of 150 mm (6 inches) of fill has been placed. Equipment may drive on Reinforced Fill at slow speeds and should exercise care not to stop suddenly or make sharp turns. No heavy equipment shall be allowed within 1 metre (3 ft.) of the back of the SRW Units.

.8 Retained Fill

.1 Retained Fill shall be placed and compacted behind the Reinforced Fill or Drainage Fill in Conventional SRW applications, in maximum lift thickness of 150 mm (6 inches).

.9 Secure Coping

.1 The Coping Adhesive may not be required as indicated in the Construction Documents.

.2 Coping units shall be secured to the top of the SRW with two 10 mm (3/8 inch) beads of Concrete Adhesive positioned 50mm (2 inches) in front and behind the tongue of the last course of SRW units.

.10 Finishing SRW

.1 Finish grading above the SRW to direct surface runoff water away from the SRW. A swale system must be used above the SRW if the grade slopes toward the back of the wall. Construct the swale with the materials and to the dimensions specified in the Construction Documents. Final grading must be established immediately to ensure the Reinforced Fill is protected from water infiltration.

.2 Upon completion of the SRW, additional structures (fences, handrails, vehicular guardrails, buildings, pools/ponds, etc.) or changes to grading/loading (increased height, slopes, parking areas, changes in proximity to water flow, etc.), other than those shown in the Construction Documents, can not be installed/implemented without the review and consent of the General Review Engineer who will typically have to consult the Designer.

END OF SECTION