NOTE TO CONSULTANTS: Edit with Track Changes turned on, any text in this section that appears in bold and italics then turn off the bold and italics for the final approved version. (Remove this Note).

PART 1- GENERAL

1.01 Description: Provide all labor, materials, and equipment to complete the work described as Gabions & Welded Wire Mesh (WWM) Retaining Wall Systems, including incidentals related to that work and coordination and support of other work specified elsewhere in the Contract Documents.

1.02 Related Sections: Coordinate related work specified in other parts of the Project Manual, including but not limited to following:

Section 02 00 00 - Existing Conditions
Section 31 00 00 - Earthwork

1.03 References: This section references the latest revisions of the following documents. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail. Other references are as follows:

A. City of Seattle Standard Plans and Specifications for Road, Bridge and Municipal Construction (most current editions).
B. City of Seattle Title 22.800: Stormwater, Grading and drainage Control Code (most recent edition)
C. R.C.W. - Chapter 39.04.180 Public Works/Trench Excavations – Safety Systems Required.
D. R.C.W. – Chapter 49.17 WISHA.
E. WAC 296-155 - Safety Standards for Construction Work.
F. WAC 296-155-660.

1.04 Quality Assurance:

A. The Contractor is responsible for verifying the quality of the work and shall perform compaction and density tests on request of the Engineer to check compliance with these specifications. A copy of the test reports shall be furnished to the Engineer.

B. The Engineer's Testing Agency may perform compaction and density tests to verify compliance with these specifications.

C. The Engineer may require that an independent testing laboratory test imported materials at any time. If the material is found to be non-compliant with the Contract, the Contractor shall bear the cost of testing, removal of all non-compliant materials from the Project Site, and replacement of the materials with materials meeting the requirements of the Contract. If the materials tested are found to be compliant with the requirements of the Contract, the Owner will reimburse the Contractor for costs incurred by testing plus mark-ups as allowed for elsewhere in the Contract.

D. It is the responsibility of the Contractor to verify the accuracy of all survey information provided by the Owner prior to commencing excavations or filling operations. Commencement of these operations constitutes acceptance of the survey information as appropriate to meet the intent of the Contract.

E. Submittals:

1. Product Data including shop drawings
2. Bulk materials: The Engineer shall approve in principle all products used in the execution of this section prior to their importation to the Project Site. Submit a particle gradation analysis in graph and table form for Select Granular Backfill material specified. Approval of the Engineer of an analysis does not constitute approval of the actual product, which may be subject to additional testing at any time per paragraph 1.04.C above.

1.05 Existing Conditions: Documentation regarding existing conditions, in addition to the current survey supplied in the Contract Drawings, includes the following;

A. Project Site Record Drawings: Complete archival documentation of previous improvements made by the Owner at the project site may be reviewed during regular business hours at the offices of the **Park Engineer, located at 800 Maynard Ave. - 3rd Floor, Seattle WA. Telephone 206-684-7034** to arrange review of these documents. Copy services are available for a fee, unless other arrangements are made.

B. Geotechnical and Soils Reports: The Owner shall provide updated geotechnical and/or soils reports in anticipation of this project if they are available. Those reports will be attached in their entirety, for informational purposes only, following this Section.

C. Other Available Information: Other information regarding utilities belonging to jurisdictions other than the Owner may be obtained through the City of Seattle Department of Parks and Recreation, Seattle Public Utilities (SPU) and/or King County - Metro.

1.06 Manufacturer's Qualifications: The Contractor shall cause the materials that are to be furnished under this section to be the product of firms that are regularly engaged in the manufacture of the specified materials.

PART 2 - PRODUCTS

2.01 General:

A. Prior to the importation of any materials, the Contractor shall provide the Engineer with a certified test lab report of the sieve analysis of each aggregate product. The Engineer shall be the final determining factor in establishing compliance with sieve

requirements. No material shall be brought onto the job site until the initial sieve analysis has been approved in writing by the Engineer.

B. During the course of importation of materials, the Contractor shall be responsible for continually checking the materials to insure that they continue to meet the Specifications.

2.02 Safety, Monitoring, & Response Equipment: The Contractor shall provide shoring, barricades, safety guards, temporary fencing, signage and/or other methods to secure trenches, open excavations, and other unsafe conditions resulting from this construction. Undertake work in full compliance with all applicable regulatory requirements.

2.02 Wire Reinforcement:

A. Wire Reinforcement and Cap Mesh: Welded wire fabric for facing shall be formed from a 90 degree bend of the soil wire reinforcement mesh and a prong to interlock with the soil reinforcing mesh above. The reinforcing shall be shop fabricated of cold drawn steel wire conforming to the minimum requirements of ASTM A-82 and shall be welded into the finished mesh fabric in accordance with ASTM A-185. Mesh shall be hot dipped galvanized at the rate of 2.0 oz/SF meeting ASTM A-123. Any damage done to the galvanized coating prior to installation shall be repaired to the satisfaction of the Engineer.

B. Wire Backing Mats shall be W5 vertical x W2.5 horizontal minimum (.2582” or 6.6 mm x .178” or 4.5 mm nominal diameter) welded wire fabric meeting ASTM A1-185 and galvanized as stated above.

C. Hardware Cloth shall be new metallic hardware cloth screen with openings not exceeding ¼ inch (6.4 mm) in accordance with ASTM A740 and shall be placed between the backfill and wire backing mat.

D. Welded Wire Reinforcement System shall be ***Hilfiker Retaining Walls (800) 762-8962 or approved equal.***

2.03 Filter Fabric: ***Mirafi, or approved equal***.

2.04 Select Granular Backfill Materials:

A. General: Select granular backfill materials shall be reasonably free from organic and otherwise deleterious materials.

B. Select granular backfill shall conform to the following gradation:

Sieve Designation	Percent by Weight Passing Std. Sieves AASHTO T 27
6 inch (152.4 mm)	100
3 inch (76.2 mm)	100-75

No. 200	0-25*

* If the percent passing the No. 200 sieve is greater than 15%, the backfill shall conform to all of the following requirements:

1. The Plasticity Index (P.I.) as determined by ASTM D-4318 (AASHTO T-90), shall not exceed 6.
2. The fraction finer that 15 microns (0.015 mm) as determined by ASTM D-422 (AASHTO T-88) shall not exceed 15 percent.
3. The material shall exhibit an angle of internal friction of not less than 34 degrees, as determined by the standard direct shear test ASTM D-3080-72 (AASHTO T-236) utilizing a sample of the material compacted to 90 percent of ASTM D-1557-92 at optimum moisture content.

C. Corrosion Requirements:

Resistivity	3000 OHM-cm (min)	AASHTO T 288
pH	5.0 to 10.0	AASHTO T289
Chlorides	200 mg/kg (ppm)	AASHTO T291
Sulfates	1000 mg/kg (ppm)	AASHTO T290

D. Testing: The Contractor shall furnish to the Engineer, a Certificate of Compliance certifying that the Select Granular Backfill material complies with this Section. A copy of all test results performed by the Contractor, which are necessary to assure compliance with the specifications, shall also be furnished to the Engineer. The frequency of sampling of Select Granular Backfill necessary to assure the above mentioned requirements shall be directed by the Engineer. Backfill not conforming to is specification shall not be used without written consent from the Engineer.

PART 3- EXECUTION

3.01 Safety Monitoring & Response: In addition to all current State and Local Safety Requirements;

A. Maintain conformance to the Contractors Health and Safety Plan.

B. When working in the presence of landfill materials (exposed refuse), the Contractor shall conform to all appropriate WAC codes and practices.

3.02 Protection of Existing Facilities:

A. Refer to Section 02 00 00 - Existing Conditions, for information pertinent to the protection of all existing facilities.

B. Repair and or replacement of damaged facilities to the Engineer’s satisfaction will be accomplished at the Contractor's expense.

3.03 Retaining Wall Excavation: Wall excavation shall be in accordance with the requirement of the Project Manual and in reasonably close conformity with the limits and construction stages shown on the Drawings. All excavation cuts and slopes shall be in accordance with governing safety regulations.

3.04 Foundation Preparation:

A. The foundation for the structure shall be graded level for a width equal to or exceeding the length of the reinforcement mat or as shown on the plans. Prior to wall construction, the foundation, if not in rock shall be compacted as directed by the Engineer. Any unsuitable material below the reinforced soil volume, as determined by the Engineer, shall be excavated for the full length of mat reinforcements and to a depth as directed by the Engineer. Excavated material that is unsuitable shall be replaced as directed by the Engineer.

B. The maximum calculated applied bearing pressure at the foundation level is as shown on the section view of the wall. It is the responsibility of the Engineer to determine that this calculated applied bearing pressure is allowable for that location.

3.05 Wall Construction:

A. Standard wire mesh reinforcement mats and applicable facing materials shall be placed in 24 inch successive horizontal lifts in the sequence shown on the plans as backfill placement proceeds. Each standard lift must have the ability to compress a minimum of 2 inches when measured at the junction of the wire facing and soil reinforcement along a 10 foot straight edge.

B. The overall vertical tolerance of the wall (top and bottom) after construction shall not exceed one (1) inch per ten (10) feet of wall height unless the wall design requires a battered facing.

3.06 Placement of Backfill Materials:

A. Backfill placement shall closely follow erection of each course of reinforcement mats. Backfill shall be placed in such a manner as to avoid any damage or disturbance to the wall materials or misalignment of the facing. Any wall materials, which become damaged or disturbed during backfill placement shall be either removed and replaced at the Contractor's expense or corrected as directed by the Engineer.

B. Backfill shall be compacted to 95 percent of AASHTO T 99 method C or D with oversize correction at optimum moisture content.

C The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer. Backfill materials shall have a placement moisture content less than or equal to or with two percentage points of optimum moisture content. Backfill materials with placement moisture content in excess or less than 2% shall be removed and reworked until the moisture content is

uniformly acceptable throughout the entire lift. The Contractor shall decrease the percentage of deviation from the optimum moisture, if necessary to obtain the specified density. The optimum moisture content shall be determined in accordance with AASHTO T 99.

D. Backfill shall be placed in complete horizontal lifts. The maximum lift thickness after compaction shall not exceed twelve (12) inches. The Contractor shall decrease this lift thickness, if necessary, to obtain the required density.

E. Compaction within three (3) feet of the back face of the wall facing shall be achieved by at least three (3) passes of a light weight mechanical tamper, roller or vibratory system.

F. At the end of each day's operation, the Contractor shall slope the last level of backfill away from the wall facing to rapidly direct run-off of rainwater away from the wall face. In addition, the Contractor shall not allow surface run-off from adjacent areas to enter the wall construction.

3. 07 Disposal of Excess and Waste Materials:

A. Remove from the Owner's property, all waste materials, including all cut ends of steel wire mats, hardware cloth, filter fabric, and other debris. Dispose of all debris off site in a legal and timely manner. Provide dump receipts from an approved dumpsite if directed.

END OF SECTION