<u>NOTE TO CONSULTANTS</u>: This section should be used for: Concrete Sidewalks, Curbs, Ramps, Slabs & Other Flatwork, not in Street Rights-of-Way). Edit with <u>Track Changes</u> 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. (<u>Remove this note</u>)

PART 1 - GENERAL

1.01 Description: Furnish all material, labor, services and related items required to complete concrete paving work indicated on drawings and/or specifications. The items of work to be performed shall include but are not necessarily limited to:

A. Concrete flatwork, slabs, sidewalks, curbs, ramps, and associated work.

1.02 Related Sections:

Section 31 00 00 - Earthwork
Section 32 11 23 - Mineral Aggregates

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. American Association of State Highway and Transportation Officials (AASHTO) "Standard Specifications for Highway Materials and Methods of Sampling and Testing"

B. City of Seattle Standard Specifications for Road, Bridge and Municipal Construction (most recent edition).

1.04 Submittals: The Contractor shall submit to the Engineer materials containing the following information:

A. Procedures to be used in the construction under this Section with regard to the division of labor and the responsibilities of the Contractor and all sub-contractors involved.

B. Furnish samples, manufacturer's product data, test reports, and materials certifications for Portland cement products, expansion joint materials, fillers, sealants, etc.

C. Provide mock-up of concrete finishes, colors, and joints on a sheet of plywood, minimum 48 inches square. Concrete mock up shall be provided for the Engineer's review a minimum of 48 hours in advance of concrete delivery.

1.05 Quality Assurance:

A. The Contractor shall provide, at the request of the Engineer, original supplier invoices for concrete. Concrete found not to be consistent with these specifications shall be removed from the project site(s) unless otherwise approved by the Engineer. The Engineer may copy the original invoices and then return them to the Contractor in a timely manner.

B. Prior to commencing the work of this Section, the Contractor shall verify the accuracy of layout and grading. Verify that all sub-grade and base course aggregate conditions are as specified. Notify the Engineer of any discrepancies and coordinate the correction of those discrepancies with other trades as necessary.

C. Notify Engineer a minimum of 48 hours prior to any concrete pour for inspection of base course aggregates, forms, reinforcing steel, and placement of joint materials. Anticipate pours to provide adequate time for inspection without causing delays to other trades. Call the **SPR Inspection Request Line @ (206) 684-7034 or by email at parksconstruction.inspection@seattle.gov** to make arrangements for inspections.

D. Protect all finished work. Vandalized work will be rejected by the Engineer and repaired/replaced by the Contractor at their expense, as directed by the Engineer.

PART 2 - PRODUCTS

2.01 Concrete Mix: Concrete mix shall be Class 5 (3/4), per Seattle Standard Specifications (most recent edition), and have characteristics as follows:

28 day compressive strength	2,300 psi
94# Sacks Cement per Cubic Yard (see "Cement", below)	5
dry Fine Aggregate (Type 2) (see "Aggregates", below)	291 lb. per sack
dry Coarse Aggregate (Type 5) (see "Aggregates", below)	387 lb. per sack
Max. Water	6.5 gal. per sack
Fiberous Reinforcement	1.5 lb. per CY
Slump (per ASTM C143)	2 – 3.5 inches

2.02 Portland Cement: Use only Type II Portland Cement, as specified in Seattle Standard Specifications (most recent edition), and AASHTO M 85.

2.03 Aggregates:

A. Fine Aggregate shall be Mineral Aggregate Type 2, per the City of Seattle Standard Specifications (most recent edition). Fine Aggregates shall consist of sand or other inert materials, or combinations thereof, having hard, strong, durable particles, free from an adherent coating. The Fine Aggregate shall be washed thoroughly to remove clay, loam, alkali, organic matter, or other deleterious matter. Mineral Aggregate Type 2 Particle Gradation shall be as follows:

Sieve Size	% Passing
#4	95 - 100

#8	68 - 86
#16	47 - 65
#30	27 - 42
#50	9 - 20
#100	0 - 7
#200 (wet)	0 - 2.5

B. Coarse Aggregate shall be Coarse Aggregate Type 5, per the City of Seattle Standard Specifications (most recent edition). Coarse Aggregate shall consist of gravel, crushed stone, or other inert material or combination thereof having hard, strong, and durable pieces free from adherent coatings. Coarse Aggregate shall be washed to thoroughly remove clay, silt, bark, sticks, alkali, organic matter, or other deleterious material. Mineral Aggregate Type 5 Particle Gradation shall be as follows:

Sieve Size	% Passing
1" Square	100
3/4" Square	80 - 100
3/8" Square	10 - 40
#4	0 -4
#200	0 -0.5

2.04 Forms: Forms shall be made of steel, wood, or other suitable materials and shall be of size and strength to resist movement during concrete placement. Use straight forms, free of defects. Use flexible spring steel forms or laminated boards to form curved edges if specified.

2.05 Steel Reinforcement:

A. Welded wire mesh to be furnished in flat sheets not rolls, unless otherwise specified or approved.

B. Reinforcing bars to be deformed steel bars, ASTM A 615, Grade 60, sized per the Drawings.

C. Concrete Engineered Reinforcing Fibers (Optional for slabs only instead of or in conjunction with steel reinforcement where vehicle traffic is anticipated):

1. Fibermesh Company, 4019 industry Drive, Chattanooga, Tennessee 37416, per ASTM C1116-89, or approved equal.

2.06 Expansion Joint Materials:

A. Joint Filler: Pre-formed non-extruding resilient material; ASTM D1752, Type I, 3/8 inch wide by depth required to bring top surface within 1/2 inch of slab surface.

B. Joint Sealer: Self-leveling polyurethane; ASTM C920, Type M, Grade SL, Class 25 (color shall match concrete color).

2.07 Curing Materials: Curing shall be per Seattle Standard Specifications (most recent edition), or as approved by the Engineer.

2.08 ADA Ramp Detectable Warning Strip: The warning strip shall be a vitrified polymer composite tile with epoxy polymer composition with an ultra violet stabilized coating of aluminum oxide particles. The tactile warning tile shall be 2 feet long by 4 feet wide Armor Tile by Engineered Plastics Inc. (916) 549-9700, or approved equal. Color: Yellow. Refer to City of Seattle and SPR Standard Details.

2.09 Utility Sleeves: Refer to the drawings and details for the locations of sleeves under paving. Sleeves shall be installed prior to placement of paving and shall be done as follows:

A. Sleeves required for utility lines located under paving (pathways and service roads within the park site) where vehicles are anticipated, shall be, **Schedule 40 PVC** or better. The inside diameter (I.D.) of the sleeve shall be **twice (2 times)** the outside diameter (O.D.) of the inserted pipe with a maximum of one (1) insert pipe per sleeve. All wiring shall be in its own separate **Schedule 40 PVC** sleeve, independent from the piping sleeves.

B. Sleeves under roadways (street rights-of-way, boulevards or parkways) where heavy vehicular traffic is anticipated, shall be ductile iron pipe. The inside diameter (I.D.) of the sleeve shall be at least **twice (2 times)** the outside diameter (O.D.) of the total inserted pipes with multiple pipes inserted per sleeve (only as directed by the Engineer). All wiring shall be in separate **Schedule 80 PVC** electrical conduit (min. 2” O.D.) within the ductile iron pipe.

C. All sleeves shall be inspected and approved by the Engineer after forms are set and before paving operations are executed. Call the **SPR Inspection Request Line @ (206) 684-7034 or by email at parksconstruction.inspection@seattle.gov** to make arrangements for inspection.

PART 3 - EXECUTION

3.01 Barriers: The Contractor shall erect and maintain barricades, canopies, guards, lights and warning signs to the extent required by law and as is prudent for the protection of the public and protection of the work.

3.02 Form Construction:

A. Set forms to required grades and alignments rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

B. Check completed formwork for grade and alignment to following tolerances:

1. Top of forms not more than 1/8” in 10 feet.
2. Vertical faces, on longitudinal axis, not more than 1/4" in 10 feet.

C. Clean forms after each use and coat with form release agent as often as required to ensure separation from concrete without damage.

3.03 Reinforcement:

A. Locate and place reinforcement as indicated on the contract drawings. Support reinforcing steel or wire fabric with pre-cast concrete blocks at spacing that will ensure minimum deflection of the reinforcement.

B. Concrete Engineered Reinforcing Fibers (Optional for slabs only instead of or in conjunction with steel reinforcement where vehicle traffic is anticipated): Add reinforcing fibers to concrete mix per manufacturer's instructions for specified comprehensive concrete strength.

3.04 Utility Sleeves:

A. Pipe trenches located under areas of existing or new paving shall have sleeves installed. Sleeves shall extend 12" beyond the pavement on each side. Trenches shall be back-filled with sand (6 inches above and 4 inches below the pipe) and compacted in layers to 95% compaction, using manual or mechanical tamping devices. Trenches for piping shall be compacted to equal the compaction of the existing adjacent undisturbed soil and shall be left in firm unyielding condition. All trenches shall be left flush with the adjoining grade. The Contractor shall set in place; cap and pressure test all piping under paving prior to paving work.

B. All sleeves installed by the Contractor prior to and during the installation of the rest of the irrigation system shall be inspected by the Engineer and the SPR Plumbing Shop with at least two (2) working days prior notice by calling the **SPR Inspection Request Line @ (206) 684-7034 or by email at parksconstruction.inspection@seattle.gov** to make arrangements for inspection.

3.05 Concrete Placement:

A. Do not place concrete until sub-base, forms, and reinforcement have been checked for line and grade. Moisten sub-base if required to provide a uniform dampened condition at time concrete is placed.

B. The concrete shall be placed and spread uniformly between the forms and thoroughly compacted with a steel shod strike-board.

C. After the concrete has been thoroughly compacted and leveled, it shall be floated with wood floats and finished at the proper time with a metal float.

3.06 Joints:

A. All Joints shall be edged with a quarter-inch (1/4") radius edger, and sidewalk edges with a half-inch (1/2") radius edger or saw cut as directed by the Engineer in the field.

B. Expansion Joint placement shall be 10' to 15' spacing (with no more than approx. 200 square feet or pavement between expansion joints), with control joint spacing equal and alternating in between. Provide Joints as shown on the Contract Drawings or as directed by the Engineer in the field.

C. Provide Expansion Joints, dividing the concrete areas as indicated on the Drawings:

1. Provide pre-molded 3/8” joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks and other fixed objects as applicable or as indicated in the Contract Drawings.
2. Expansion Joints shall be located and placed according to the Contract Drawings, and sufficiently supported to ensure final placement perpendicular to the finished surface of the pavement.
3. Extend joint fillers full width and depth of joint and not less than 1/2 inch or more than 1 inch below finished surface where joint sealer is indicated. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together. Protect top edge of joint filler during concrete placement with a metal or plastic temporary strip. Remove protection after concrete has been placed on both sides of joint before sealant is applied.

D. Provide Control Joints, dividing the concrete areas as indicated on the Drawings.

1. Form Control Joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.
2. Saw Control Joints into hardened concrete using power saws equipped with shatterproof abrasive or diamond rimmed blades. Cut joints into concrete as soon as surface will not be torn, abraded, or otherwise damaged by cutting action.

3.07 Concrete Finishing:

A. After striking off and consolidating concrete, smooth surface by screening and floating. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface irregularities, and refloat repaired area to provide a continuous smooth finish.

B. After completion of floating and trowelling when excess moisture or surface sheen has disappeared, complete finishing as follows:

1. Light broom finish, by drawing fine hair broom across concrete surface, perpendicular to line of traffic after the tooled grid is installed. The Engineer’s decision will be final on acceptance of joint finishing details and surface finishes.

3.08 Curing: Protect and cure finished concrete paving, complying with applicable requirements of the References specified in this Section. Use only pre-approved curing and sealing compound or moisture curing method.

3.09 Clean-up:

A. Repair and replace broken or defective concrete as directed by the Engineer.

B. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least fourteen (14) days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

C. Sweep concrete pavement and wash free of stains, discoloration, dirt and other foreign material just prior to final inspection.

END OF SECTION