

**World Plaza
Relocalización de Compactadora de Basura**

DIVISION - 2 SITE CONSTRUCTION

SECTION- 02 52 00 SITE WORK CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

- a. This work shall cover site work concrete constructed upon the prepared sub-grade and in conformance with the lines, grades, thickness, and cross sections as shown.
- b. Construction shall include the following:
 - 1. Curb, gutter, combination of curb and gutter and wheel stop.
 - 2. Pedestrian Pavement: Walks, grade slabs, wheelchair curb ramps, terraces, and steps.
 - 3. Vehicular Pavement: driveways.
 - 4. Equipment Pads: Trash compactor and hydraulic fluid pump, fuel tanks, generators.

1.2 RELATED WORK

- a. DIVISION 1, GENERAL REQUIREMENTS.
- b. Sub-grade Preparation: Section 02 20 00, EARTHWORK.
- c. Concrete Materials, Quality, Mixing, Design and Other Requirements; Section 03 30 00, CAST-IN-PLACE-CONCRETE.
- d. Steel loading dock expansion and Railing: Section 05 50 00, METAL FABRICATIONS.

1.3 WEATHER LIMITATIONS

- a. Placement of concrete shall be as specified under paragraphs, HOT WEATHER of Section 03 30 00, CAST-IN-PLACE CONCRETE.

1.4 SELECT SUB-BASE MATERIAL JOB-MIX

- a. The Contractor shall retain and reimburse a testing laboratory to design a select sub-base material mixture and submit a job-mix formula to the Architect or Engineer in writing for approval. The formula shall include the source of materials, gradation, plasticity index, liquid limit, and laboratory compaction curves indicating maximum density at optimum moisture.

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1.5 SUBMITTALS

- a. In accordance with Section 01 30 00, SUBMITTALS, furnish the following:
- b. Manufacturers' Certificates and Data certifying that the following materials conform to the requirements specified.
 - 1. Expansion joint filler
 - 2. Hot poured sealing compound
 - 3. Reinforcement
 - 4. Curing materials
- c. Data and Test Reports: Select sub-base material.
 - 1. Job-mix formula
 - 2. Source, gradation, liquid limit, plasticity index, percentage of wear, and other tests as specified and in referenced publications.

PART 2 - PRODUCTS

2.1 GENERAL

- a. Concrete shall be Type C, air-entrained as specified in Section, CAST-IN-PLACE CONCRETE, with the following exceptions:

TYPE	MAXIMUM SLUMP*
Curb & Gutter	3"
Pedestrian Pavement	3"
Vehicular Pavement	2" Machine Finished 4" Hand Finished
Equipment Pad	3" to 4"

* For concrete to be vibrated: Slump as determined by ASTM C143. Tolerances as established by ASTM C94.

2.2 REINFORCEMENT

- a. The type, amount, and locations of steel reinforcement shall be as shown and specified. Welded wire-fabric shall conform to AASHTO M55. Dowels shall be plain steel bars conforming to AASHTO M31 or M42. Tie bars shall be deformed steel bars conforming to AASHTO M31 or M42.

2.3 CRUSHED STONE OR GRAVEL FILL

- a. Fill to be placed under concrete equipment pads on grade shall be graded from one inch to No. 4, tamped and leveled. The thickness shall be 6 inches unless otherwise indicated.

2.4 SELECT SUBBASE

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- a. Sub-base material shall consist of selected granular material composed of sand, sand-gravel, crushed stone, crushed or granulated slag, with or without soil binder, or combinations of these materials conforming to AASHTO M147, Grading E or F. Materials meeting other gradations than that noted, will be acceptable whenever the gradations are within a tolerance of three to five percent, plus or minus, of the single gradation established by the job-mix formula. Sub-base material shall produce a compacted, dense-graded course meeting the density requirement herein specified.

2.5 FORMS

- a. Use metal or wood forms that are straight and suitable for the work involved in cross-section, depth, and strength to resist springing during depositing and consolidating the concrete. Wood forms should be at least 2 inches thick. Do not use forms if they vary from a straight line more than 1/8 inch in any ten feet long section in either a horizontal or vertical direction. Wood forms shall also be free from warp, twist, loose knots, splits, or other defects. Use approved flexible or curved forms for radius forming.

2.6 CONCRETE CURING MATERIALS

- a. Concrete curing materials shall conform to one of the following:
 - 1. Burlap conforming to AASHTO M182 having a weight of seven ounces or more per yard when dry.
- b. Impervious sheeting conforming to AASHTO M171.
- c. Liquid Membrane Curing Compound conforming to AASHTO M148, Type 2, and shall be free of paraffin or petroleum.

2.7 JOINT SEALER

- a. Material shall conform to AASHTO M173.

PART 3 - EXECUTION

3.1 SUBGRADE PENETRATION

- a. Prepare, construct, and finish the sub-grade as specified in Section 022000-EARTHWORK. Test the complete sub-grade for grade and cross section with a template. Maintain the sub-grade in a smooth compacted condition, in conformance with the required section and established grade until the succeeding operation has been accomplished.

3.2 SELECT SUB-BASE

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- a. **Mixing:** Proportion the select sub-base by weight or by volume in quantities so that the final approved job-mixed formula gradation, liquid limit, and plasticity index requirements will be met after sub-base course has been placed and compacted. Add water in approved quantities, measured by weight or volume, in such a manner to produce a uniform blend.
- b. **Placing:** Place the mixed material on the prepared sub-grade in a uniform layer to the required contour and grades, and to a loose depth not to exceed 8 inches, that when compacted, will produce a layer of the designated thickness. When the designated compacted thickness exceeds 6 inches, place the material in layers of equal thickness. Remove unsatisfactory areas and replace with satisfactory mixture, or mix the material in the area. In no case will the addition of thin layers of material be added to the top layer in order to meet grade. If the elevation of the top layer is 1/2 inch or more below the grade, excavate the top layer and replace with new material to a depth of at least 3 inches in compacted thickness.
- c. **Compaction:** Perform compaction with approved equipment (hand or mechanical) well suited to the material being compacted. Moisten or aerate the material as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used. Compact each layer to at least 95 percent or 100 percent of maximum density as determined by AASHTO T180 or AASHTO T99 respectively.
- d. **Smoothness Test and Thickness Control:** Test the completed sub-base for grade and cross section with a straight edge. The surface of each layer shall not show any deviations in excess of 3/8 inch. The completed thickness shall be within 1/2 inch of the thickness as shown.
- e. **Protection:** Maintain the finished sub-base in a smooth and compacted condition until the concrete has been placed. When Contractor's subsequent operations or adverse weather disturbs the approved compacted sub-base, excavate, and reconstruct it with new material meeting the requirements herein specified, at no additional cost to the Government.

3.3 SETTING FORMS

- a. **Base Support:** Compact the foundation under the forms true to grade so that, when set, they will be uniformly supported for its entire length at the grade as shown. Correct imperfections or variations in the foundation grade by cutting or filling and compacting.
- b. **Form Setting:** Set forms sufficiently in advance of the placing of the concrete to permit the performance and approval of all operations required with and adjacent to the form lines. Set forms to true line and grade and use stakes, clamps, spreaders, and braces to hold them rigidly in place so that the forms and joints are free from play or movement in any direction. Forms shall conform to line and grade with an allowable tolerance of 3 mm (1/8 inch) when checked with a straightedge and shall not deviate from true line by more than 6 mm (1/4 inch) at

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any point. Do not remove forms until removal will not result in damaged concrete or at such time to facilitate finishing. Clean and oil forms each time they are used.

- c. A Registered Professional Land Surveyor or Registered Civil Engineer specified in DIVISION 1 GENERAL REQUIREMENTS shall establish and control the alignment and grade elevations of the forms. Make necessary corrections to forms immediately before placing concrete. When any form has been disturbed or any sub-grade has become unstable, reset and recheck the form before placing concrete.

3.4 EQUIPMENT

- a. The Owner shall approve equipment and tools necessary for handling materials and performing all parts of the work prior to commencement of work. Maintain equipment and tools in satisfactory working condition at all times.

3.5 PLACING REINFORCEMENT

- a. Reinforcement shall be free from dirt, oil, rust, scale or other substances that prevent the bonding of the concrete to the reinforcement. Before the concrete is placed, the Architect shall approve the reinforcement, which shall be accurately, and securely fastened in place with suitable supports and ties. Do not place reinforcement within 2 inches of an exposed surface. The type, amount, and position of the reinforcement shall be as shown.

3.6 PLACING CONCRETE - GENERAL

- a. Remove debris and other foreign material from between the forms before placing concrete. Obtain approval of the Owner before placing concrete. Before the concrete is placed, uniformly moisten the sub-grade, avoiding puddles of water. Convey concrete from mixer to final place of deposit by a method, which will prevent segregation or loss of ingredients. Deposit concrete so that it requires as little handling as possible. Use shovels, not rakes, to do the necessary hand spreading. While being placed, spade or vibrate and compact the concrete with suitable tools to prevent the formation of voids or honeycomb pockets. Spade or vibrate and tamp the concrete especially well against the forms and along all joints. Over-vibration or manipulation causing segregation will not be permitted. Place concrete continuously between joints without bulkheads. Install a construction joint whenever the placing of concrete is suspended for more than 30 minutes and at the end of each day's work. Workmen or construction equipment coated with foreign material shall not be permitted to walk or operate in the concrete during placement and finishing operations.

3.7 PLACING CONCRETE FOR CURBS, GUTTER, PEDESTRIAN PAVEMENT AND EQUIPMENT PADS

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- a. Place concrete in the forms in one layer of such thickness that, when compacted and finished, it will conform exactly to the cross section as shown. Deposit concrete as near to joints as possible without disturbing them but do not dump onto a joint assembly. After the concrete has been placed in the forms, use a strike-off guided by the side forms to bring the surface to the proper section to be compacted. Consolidate the concrete thoroughly by tamping and spading, or with approved mechanical finishing equipment. Finish the surface to grade with a wood or metal float.

3.8 PLACING CONCRETE FOR VEHICULAR PAVEMENT

- a. Deposit concrete into the forms as close as possible to its final position. Place concrete rapidly and continuously between construction joints. Strike off concrete and thoroughly consolidate by a finishing machine, vibrating screed, or by hand finishing. Finish the surface to the exact elevation and crown as shown. When the forward motion of the vibrating screed is stopped, shut off the vibrator. Deposit concrete as near the joints as possible without disturbing them but do not dump onto a joint assembly.

3.9 CONCRETE FINISHING - GENERAL

- a. Start finishing operations immediately after placement of the concrete. Use machine method or the hand method for finishing. The sequence of operations, unless otherwise indicated, shall be as follows: Consolidating, floating, straight-edging, troweling, texturing, and edging of joints. Maintain finishing equipment and tools in a clean and approved condition.

3.10 CONCRETE FINISHING CURB AND GUTTER

- a. Round the edges of the gutter and top of the curb with an edging tool to a radius of 1/4 inch or as otherwise detailed. Float the surfaces and finish with a smooth wood or metal float until true to grade and section and uniform in textures. Finish the surfaces, while still wet, with a bristle type brush with longitudinal strokes. Immediately after removing the front curb form, rub the face of the curb with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. Brush the surface, while still wet, in the same manner as the gutter and curb top. Except at grade changes or curves, finished surfaces shall not vary more than 1/8 inch for gutter and 1/4 inch for top and face of curb, when tested with a 10 foot straightedge. Remove and reconstruct irregularities exceeding the above for the full length between regularly scheduled joints. Correct any depressions, which will not drain. Visible surfaces and edges of finished curb, gutter, and combination curb and gutter shall be free of blemishes, form marks, and tool marks, and shall be uniform in color, shape, and appearance.

3.11 CONCRETE FINISHING PEDESTRIAN PAVEMENT

- a. Walks, Grade Slabs, Lawn Mower Crossings, Wheelchair Curb Ramps: Finish the surfaces to grade and cross section with a metal float, trowled smooth and

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finished with a broom moistened with clear water. Brooming shall be transverse to the line of traffic. Finish all slab edges, including those at formed joints, carefully with an edger having a radius of 1/8 inch. Unless otherwise indicated, edge the transverse joints before brooming. The brooming shall eliminate the flat surface left by the surface face of the edger. Execute the brooming so that the corrugation, thus produced, will be uniform in appearance and not more than 1/16 inch in depth. The completed surface shall be uniform in color and free of surface blemishes, form marks, and tool marks. The finished surface of the pavement shall not vary more than 3/16 inch when tested with a 10-foot straightedge. The thickness of the pavement shall not vary more than 1/4 inch. Remove and reconstruct irregularities exceeding the above for the full length between regularly scheduled joints.

- b. Steps: The method of finishing the steps and the sidewalls is similar to above except as herein noted. Remove the riser forms one at a time, starting with the top riser. After removing the riser form, rub the face of the riser with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. Use an outside edger to round the corner of the tread; use an inside edger to finish the corner at the bottom of the riser. Give the risers and sidewall a final brush finish. The treads shall have a final finish with a stiff brush to provide a non-slip surface. The texture of the completed steps shall present a neat and uniform appearance and shall not deviate from a straightedge test more than 3/16 inch.

3.12 CONCRETE FINISHING VEHICULAR PAVEMENT

- a. Use either machine or hand methods for finishing. Accomplish longitudinal floating with a longitudinal float not less than 10 feet long and 6 inches wide, properly stiffened to prevent flexing and warping. Operate the float from footbridges in a sawing motion parallel to the direction in which the pavement is being laid from one side of the pavement to the other and advancing not more than half the length of the float. After the longitudinal floating is completed, but while the concrete is still plastic, eliminate minor regularities in the pavement surfaces by means of metal floats, 5 feet in length, and straightedges, 10 feet in length. Use the floating to smooth and fill open textured areas in the pavement surfaces, but minimize their use. Make the final finish with the straightedges, which shall be used to float the entire pavement surface. Test the surface for trueness with a 10 foot straightedge held in successive positions parallel and at right angles to the direction in which the pavement is being laid and the entire area covered as necessary to detect variations. Advance the straightedge along the pavement in successive stages of not more than one half the length of the straightedge. Correct all irregularities and refinish the surface. The finished surface of the pavement shall not vary more than 1/4 inch in both longitudinal and transverse directions when tested with a 10-foot straightedge. The thickness of the pavement shall not vary more than 1/4 inch. When most of the water glaze or sheen has disappeared and before the concrete becomes non-plastic, give the surface of the pavement a broomed finish with an approved fiber broom not less than 18 inches wide. Pull the broom gently over the surface of the pavement from edge to edge. Slightly overlap adjacent strokes. Brooming shall be transverse to

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the line of traffic and so executed that the corrugations thus produced will be uniform in character and width, and not more than 1/8 inch in depth. Carefully finish the edge of the pavement along forms and at the joints with an edging tool. The brooming shall eliminate the flat surface left by the surface face of the edger. The finish surfaces of new and existing abutting pavements shall coincide at their juncture.

3.13 CONCRETE FINISHING EQUIPMENT PADS

- a. After the surface has been struck off and screeded to the proper elevation, give it a smooth dense float finish, free from depressions or irregularities. Carefully finish all slab edges with an edger having a radius of one inch or as shown. After removing the forms, rub the faces of the pad with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The finish surface of the pad shall not vary more than 1/8 inch when tested with a 10-foot straightedge. Correct irregularities exceeding the above.

3.14 JOINTS - GENERAL

- a. Place joints, where shown, conforming to the details as shown, and perpendicular to the finished grade of the concrete surface. Joints shall be straight and continuous from edge to edge of the pavement.

3.15 FORM REMOVAL

- a. Forms shall remain in place at least 12 hours after the concrete has been placed. Remove forms without injuring the concrete. Do not use bars or heavy tools against the concrete in removing the forms. Promptly repair any concrete found defective after form removal.

3.16 SEALING JOINTS

- a. At the end of the curing, carefully clean and fill joints with joint sealer as shown. The concrete at the joint shall be surface dry and the ambient temperature shall be above 50°F at the time of application. The joint sealer shall not spill over the joint onto adjacent surface. Refill joints where necessary before final acceptance. Do not seal joints of pedestrian pavement.

3.17 CURING OF CONCRETE

- a. Cure concrete by one of the following methods appropriate to the weather conditions and local construction practices, against loss of moisture, and rapid temperature changes for at least seven days from the beginning of the curing operation. Protect unhardened concrete from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready to install before actual concrete placement begins. Provide protection as necessary to prevent cracking of the pavement due to temperature changes during the curing period. If any selected method of curing does not afford the proper curing and protection against concrete cracking, remove and

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replace the damaged pavement and employ another method of curing as directed by the Architect.

3.18 CLEANING

- a. After completion of the curing period, remove the curing material, sweep the concrete clean, and, after removal of all foreign matter from the joints, seal joints as herein specified. Clean the entire concrete of all debris and construction equipment as soon as curing and sealing of joints has been completed.

3.19 PROTECTION

- a. The contractor shall protect the concrete against all damage prior to final acceptance by the Owner. Remove concrete containing excessive cracking, fractures, spalling, or other defects and reconstruct the entire section between regularly scheduled joints, when directed by the Architect, and at no additional cost to the Owner. Exclude traffic from vehicular pavement until the concrete is at least seven days old, or for a longer period if so directed by the Owner.

3.20 FINAL CLEAN-UP

- a. Remove all debris, rubbish and excess material from the job site.

END OF SECTION