SECTION 044313 - STONE MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this Section.

1.2 SUMMARY

A. Section includes the following stone masonry:

1. Stone/masonry veneer anchored to concrete walls and pilasters.

B. Related Sections:

1. City and Borough of Juneau Standard Specifications.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1. For stone varieties proposed for use on Project, include test data indicating compliance with physical properties required by referenced ASTM standards.

B. Samples:

1. For each stone type indicated provide rock and color samples to be approved by Landscape Architect prior to fabrication.
2. For each color of mortar required provide colors to be approved by Landscape Architect.

1.4 MOCK-UPS

A. 10 linear feet of masonry shall be installed for each type/pattern described in Article 3.2. This area can be used to determine the joint sizes, lines, laying pattern(s), color(s) and texture of the Project. This area shall be the standard from which the WORK will be judged. Unsatisfactory mock-ups shall be removed and reinstalled until deemed acceptable and approved.

1.5 PROJECT CONDITIONS

A. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work.

B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried.

C. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 STONE VENEER FOR MASONARY

A. Provide sound natural quarry stone as follows:

1. Products: Subject to compliance with requirements, provide the following, or approved equal.

a. Stone: I-Bex. To be verified by Landscape Architect.
b. Thickness: 4 inches
c. Range of Sizes: As approved, to match scale of masonry wall
d. Finish: Natural cleft spilt face finish.

2.2 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Masonry Cement: ASTM C 91.

D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in stone masonry mortar.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Davis Colors; True Tone Mortar Colors.
b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
c. Solomon Colors; SGS Mortar Colors.

2.3 VENEER ANCHORS

A. Hot-Dip Galvanized-Steel Sheet: ASTM A 1008/A 1008M, cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M, Class B-2.

B. Corrugated-Metal Veneer Anchors: Not less than 0.030-inch thick by 7/8-inch wide hot-dip galvanized steel sheet with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch.

2.4 MISCELLANEOUS MASONRY ACCESSORIES

A. Asphalt Damp proofing: Asphalt emulsion complying with ASTM D 1227, Type III or IV.

2.5 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar and grout stains, efflorescence, and other new construction stains from stone masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cleaner manufacturer and stone producer.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Diedrich Technologies, Inc.
b. Dominion Restoration Products.
c. EaCo Chem, Inc.
d. Hydrochemical Techniques, Inc.
e. Prosoco, Inc.

2.6 MORTAR MIXES

A. General: Do not use admixtures unless otherwise indicated.

1. Do not use calcium chloride.
2. Limit cementitious materials in mortar to Portland cement and lime.
3. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

B. Mortar for Stone Masonry: Comply with ASTM C 270, Proportion Specification.

1. Mortar for Setting Stone: Type M with Dry Block, or approved equal.

2.7 FABRICATION ROCK MASONRY FOR CONCRETE WALLS

A. Select stone to produce pieces of thickness, size, and shape indicated, including details on Drawings. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated.

B. Shape stone for type of masonry (pattern) as follows:

1. Ledgestone with uniform course heights and uniform lengths as indicated on Drawings.

C. Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match approved samples and mockups.

1. Finish: Natural cleft spilt face finish.

PART 3 - EXECUTION

3.1 PREPARATION OF ROCK MASONRY FOR CONCRETE WALLS

A. Coat concrete and unit masonry backup with asphalt damp proofing for all areas in contact with soil.

3.2 SETTING OF STONE MASONRY FOR CONCRETE WALLS

A. Perform necessary field cutting and trimming as stone is set.

1. Use hammer and chisel to split stone that is fabricated with split surfaces.

B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.

C. Arrange stones with course heights as indicated, random lengths, and uniform joint widths, with offset between vertical joints as indicated.

D. Maintain uniform joint widths except for variations due to different stone sizes and where minor variations are required to maintain bond alignment if any. Lay walls with joints not less than 1/4 inch at narrowest points or more than 3/8 inch at widest points.

3.3 INSTALLATION OF ANCHORED STONE MASONRY

A. Anchor stone masonry to concrete with corrugated-metal veneer anchors unless otherwise indicated. Secure anchors by inserting dovetailed ends into dovetail slots in concrete.

B. Anchor stone masonry to unit masonry with corrugated-metal veneer anchors unless otherwise indicated. Embed anchors in unit masonry mortar joints or grouted cells for distance at least one-half of unit masonry thickness.

C. Space anchors not more than 16 inches on center vertically and 36 inches on center horizontally. Install additional anchors within 12 inches of openings, sealant joints, and perimeter at intervals not exceeding 12 inches.

D. Set stone in full bed of mortar with full head joints unless otherwise indicated. Build anchors into mortar joints as stone is set.

3.4 ADJUSTING AND CLEANING

A. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.

B. Final Cleaning masonry for concrete walls: After mortar is thoroughly set and cured, clean stone masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
4. Wet wall surfaces with water before applying cleaner; remove cleaner promptly by rinsing thoroughly with clear water.
5. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20 Revised II, using job-mixed detergent solution.
6. Clean stone masonry with proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION 044313

SECTION 312001

EXCAVATION AND EMBANKMENT

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. The WORK under this Section includes providing all labor, materials, tools and equipment necessary for excavation and embankment construction to the lines, grades and cross sections indicated in the Drawings or as directed by the DEPARTMENT.

1.03 SUBMITTALS

A. Select Borrow – sample for gradation analysis.

PART 2 – PRODUCTS

2.01 EXCAVATION

A. All excavation shall be unclassified excavation, and shall consist of excavation and disposal of all materials, of whatever character, encountered in the WORK.

2.02 EMBANKMENT

A. Material for embankment construction shall consist of non-frost-susceptible earth, sand, gravel, fractured rock or combination thereof containing no muck, peat, frozen materials, roots, sod or other deleterious materials, and shall be compactable to the density required by the Specifications.

2.03 SELECTED EMBANKMENT

A. Selected Embankment shall meet all the requirements for Embankment Material, and in addition, shall have a plasticity index not greater than 6 as determined by AASHTO T 90 and shall contain no more than 6% by weight of material passing the 200 mesh sieve. The percentage of material passing the 200 mesh sieve shall be determined using only the material which passes a 3 inch sieve.

2.04 BORROW

A. Borrow shall meet the requirements for Embankment above.

2.05 SELECTED BORROW

A. Selected Borrow shall meet the requirements for Selected Embankment above.

2.06 2-INCH MINUS SHOT ROCK

A. 2-Inch Minus Shot Rock shall contain no mulch, frozen material, roots, sod or other deleterious matter.

B. The shot rock shall have a plasticity index not greater than 6, as determined by AASHTO T 90. It shall consist of not more than 3% by weight of particles that pass the NO. 200 sieve, as determined by ATM T-7.

C. At least 50% by weight of the particles retained on the 3/8-inch sieve shall have at least two fractured faces as determined by ATM T-4.

D. At least 70% by weight of particles shall be retained on the 1-inch sieve.

E. Elongation Specifications:
The length of the crushed stone backfill shall not be more than twice the designated screen dimensions.

F. Sodium Sulfate Loss:
Aggregate shall pass the percent sodium sulfate loss per AASHTO T 104 with 9% maximum.

G. LA Abrasion:
Percent of wear per AASHTO T 96 shall be 45% maximum.

H. 2-Inch Shot Rock for this Project shall have a maximum Nordic Abrasion value of 22. Test procedure for Nordic Abrasion is Alaska Test Method 312. This is available at the State of Alaska Department of Transportation and State of Alaska Department of Transportation and Public Facilities Southeast Region Materials Laboratory.

PART 3 – EXECUTION

3.01 EXCAVATION

A. Excavations shall be reasonably smooth and uniform to the lines, grades and cross sections shown in the Drawings or as directed by the DEPARTMENT. Excavations shall be conducted to ensure that material outside of excavation limits remains undisturbed.

B. Excavations shall be protected from erosion and maintained to drain freely at all times.

C. When excavation to the limits indicated on the Drawings encounters unsuitable underlying material, the DEPARTMENT may require the CONTRACTOR to remove the unsuitable material and backfill with approved material. The CONTRACTOR shall take the necessary cross section measurements before backfill is placed in order to measure the amount of unsuitable material removed.

D. Excavated soils that do not meet the requirements for embankment material and surplus suitable excavation shall be disposed of by the CONTRACTOR at a location and in a

manner approved by the DEPARTMENT. No material may be wasted without the prior approval of the DEPARTMENT.

E. The CONTRACTOR is responsible for securing a waste disposal site if none is indicated on the Drawings. The CONTRACTOR shall obtain the written permission of the landowner for use of all disposal sites, and shall either obtain any required permits or assure that they have been obtained by others. If required by the DEPARTMENT, the CONTRACTOR shall furnish the permit numbers of all required permits for the disposal sites. The costs of securing such sites shall be borne by the CONTRACTOR.

F. Temporary storage of useable or suitable excavation is the responsibility of the CONTRACTOR, and no additional payment will be made.

G. The CONTRACTOR shall conduct all operations to prevent contaminating useable excavation with unsuitable material.

H. The CONTRACTOR shall provide added care when excavating adjacent to existing roadways, sidewalks, curbs, retaining walls and underground utilities. Damage caused to existing roadways, sidewalks, curbs, retaining walls and underground utilities by the CONTRACTOR shall be repaired at the CONTRACTOR's expense.

I. After excavation to the subcut limit is complete and prior to backfilling with base course grading D-1, the bottom of the subcut shall be proof rolled with a walk behind compactor until a firm base for the backfill material is obtained.

3.02 EMBANKMENT

A. Embankments shall be constructed to a reasonably smooth and uniform shape conforming to the lines, grades and cross sections indicated on the Drawings or as directed by the DEPARTMENT.

B. Embankment shall not be placed on frozen ground.

C. When embankment is to be placed on both sides of a concrete wall, operations shall be so conduced that the embankment is always at approximately the same elevation on both sides of the structure.

D. The finish subgrade surface (bottom of base course level) shall not vary more than 0.05-foot when tested using a ten foot straightedge, applied parallel with and at right angles to the centerline of the new walls to receive base course grading D-1 material, nor vary more than 0.05-foot from the established grade.

3.03 EMBANKMENTS CONSTRUCTED WITH MOISTURE DENSITY CONTROL

A. Except for embankments constructed predominantly of rock fragments or boulders, all embankments shall be constructed with moisture density control. Embankments shall be placed in horizontal layers not to exceed 12 inches in depth, loose measurement, for the full width of the embankment, except as required for traffic, and shall be compacted before the next layer is placed. A smaller depth will be required if the compaction equipment is considered by the DEPARTMENT to be insufficient to obtain the required

densities. Embankments shall be compacted at the approximate optimum moisture content to not less than 95% of the maximum density as determined by AASHTO T 180 D or Alaska T-12. Embankment materials may require drying or moistening to bring the moisture content near to optimum. In-place field densities will be determined by Alaska T-3 or T-11. Sufficient time shall be allowed between placement of layers to allow for field density tests.

3.04 2-INCH MINUS SHOT ROCK w/BASE COURSE

A. The full depth of 2-inch minus shot rock shall be graded to a uniform surface and compacted with a vibratory roller prior to placing base course, Grading D-1. No base course, Grading D-1, shall be placed until the 2-inch minus shot rock layer has been approved by the DEPARTMENT.

B. If base course, Grading D-1, is used as a leveling course for the curb and gutter, all of this base course material shall be removed from the 2-inch minus shot rock to the front face of the concrete gutter, and the additional 2-inch minus shot rock required to bring the street area to its required full depth shall be placed, graded and compacted prior to placing the top layer of base course, Grading D-1.

END OF SECTION

SECTION 312003

BASE COURSE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. The WORK under this Section includes providing all labor, materials, tools and equipment necessary for furnishing and placing one or more layers of aggregate base or leveling course on a prepared surface to the lines and grades shown on the Drawings.

1.03 SUBMITTALS

A. Base course grading D-1 gradation and modified proctor from independent laboratory from current construction season.

PART 2 - PRODUCTS

2.01 MATERIAL

A. Aggregate base course shall consist of crushed gravel or crushed stone, conforming to the quality requirements of AASHTO M 147. The aggregate shall be free from lumps, balls of clay, or other objectionable matter, and shall be durable and sound.

B. The base course shall be sampled according to "WAQTC FOP for AASHTO T2-Sampling Aggregates" as described in the *Alaska Test Methods Manual*, published by the Alaska Department of Transportation and Public Facilities.

C. Coarse aggregate (that material retained on a No. 4 sieve) shall be crushed stone and shall consist of sound, tough, durable rock of uniform quality. Rock shall be free of schist that cleaves along preferred foliation planes. Rock shall be free of platy mineral grains. Metamorphosed rock shall be free of slaty cleavage. All material shall be free of from clay balls, vegetable matter or deleterious matters. Coarse aggregate shall not be coated with dirt or other finely divided matter. All aggregates shall be free of roots and wood. In addition, coarse aggregate shall meet the following requirements:

L.A. Wear, %, 25% maximum loss in accordance with AASHTO T 96.
Degradation Value, 45 minimum in accordance with ATM 313.
Sodium Sulfate Soundness Loss, %, 9 maximum in accordance with AASHTO T 104.

D. Base course material shall conform to the following gradations:

BASE COURSE GRADING D-1 GRADATION
(Percent passing by weight)

Sieve Size	D-1
1"	100
3/4"	70-100
3/8"	50-80
No. 4	35-50
No. 8	20-35
No. 40	8-20
No. 200	0-6

For grading D-1, at least 70% by weight of the particles retained on a No. 4 sieve shall have at least one fractured face as determined by Alaska T-4.

PART 3 - EXECUTION

3.01 GENERAL

A. Prior to placement of the base course, the underlying surface shall be prepared by dressing, shaping, wetting or drying, and compacting of the underlying material to a minimum density of 95% as determined by AASHTO T 180-D. Surfaces shall be cleaned of all foreign substances and debris.

B. Any ruts or soft yielding spots that may appear shall be corrected by loosening and removing unsatisfactory material and adding approved material as required, reshaping, and recompacting the affected areas to the lines and grades indicated on the Drawings. If required by the DEPARTMENT the CONTRACTOR shall proof load questionable areas with equipment approved by the DEPARTMENT.

C. Blue-top grading hubs shall be set to the top of base course at centerline and at the edge of asphalt pavement where no curb and gutter is to be installed. They shall be set by the CONTRACTOR at breaks in grade and on even grade at intervals not to exceed 25 feet, with additional stakes at vertical and horizontal curves.

D. Base course material shall be deposited and spread in a uniform layer to the required grades, and to such loose depth that when compacted to the density required, the thickness will be as indicated on the Drawings. Portions of the layer which become segregated shall be removed and replaced with a satisfactory mixture, or shall be remixed to the required gradation.

E. The maximum compacted thickness of any one layer shall not exceed six inches, except the compacted depth of a single layer may be increased to eight inches if compaction equipment capable of delivering sufficient compactive energy, as determined by the DEPARTMENT, is used. If the contract documents require the compacted depth to exceed six inches, the base shall be constructed in two or more layers of approximately equal thickness. Each layer shall be shaped and compacted before the succeeding layer is placed.

F. The base course shall be compacted to at least 95% of maximum density as determined by AASHTO T 180-D. In places not accessible to rolling equipment, the mixture shall be compacted with hand-tamping equipment.

G. Grading, rolling, and tamping shall continue until the surface is smooth and free from waves and irregularities. If at any time the mixture is excessively moistened, it shall be serrated by means of hand luting, harrows, or other approved equipment, until the moisture content is such that the surface can be recompacted and finished as above.

H. The finished surface of the base course, when testing using a ten foot straightedge shall not show any deviation in excess of 3/8 inch between two contact points. The finish surface shall not vary more than 1/2 inch from established grade. Additionally, the algebraic average of all deviations from established grade of the finish base course surface elevations taken at 50-foot intervals shall be less than 0.02 foot.

I. The initial density at any location will be paid for by the DEPARTMENT. If the initial test shows that the material compaction is not as specified, the CONTRACTOR shall modify the compaction methods used, as approved by the DEPARTMENT, and have the material retested until the tests show that the compaction meets the Specification requirements. All tests, after the initial test at any given location, shall be paid for by the CONTRACTOR.

END OF SECTION

SECTION 312318

TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 DUST ABATEMENT

A. The CONTRACTOR shall furnish all labor, equipment, and means required and shall carry out effective measures wherever and as often as necessary to prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity. The CONTRACTOR shall be responsible for any damage resulting from any dust originating from its operations. The dust abatement measures shall be continued until dust is no longer produced and the CONTRACTOR is relieved of further responsibility by the DEPARTMENT.

1.03 RUBBISH CONTROL

A. During the progress of the WORK, the CONTRACTOR shall keep the site of the WORK and other areas used by it in a neat and clean condition, and free from any accumulation of rubbish. The CONTRACTOR shall dispose of all rubbish and waste materials of any nature occurring at the WORK site, and shall establish regular intervals of collection and disposal of such materials and waste. No burning is permitted on site. The CONTRACTOR shall also keep its haul roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Disposal of all rubbish and surplus materials shall be off the site of construction in accordance with local codes and ordinances governing locations and methods of disposal, and in conformance with all applicable safety laws, and to the particular requirements of Part 1926 of the OSHA Safety and Health Standards for Construction.

1.04 SANITATION

A. Toilet Facilities: Fixed or portable chemical toilets shall be provided wherever needed for the use of employees. Toilets at construction job sites shall conform to the requirements of Part 1926 of the OSHA Standards for Construction.

B. Sanitary and Other Organic Wastes: The CONTRACTOR shall establish a regular daily collection of sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the CONTRACTOR or organic material wastes from any other source related to the CONTRACTOR's operations shall be disposed of away from the site in a manner satisfactory to the DEPARTMENT and in accordance with all laws and regulations pertaining thereto.

1.05 CHEMICALS

A. All chemicals used during Project construction or furnished for Project operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant or of other classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. Use of all such chemicals and disposal of residues shall be in strict accordance with the printed instructions of the manufacturer. In addition, see the requirements set forth in paragraph 6.11 of the General Conditions.

1.06 EAGLE NESTING TREES

A. Eagle nesting trees are known to exist in the Juneau area, although none are known to exist in the immediate vicinity of the Project site. The CONTRACTOR has the responsibility for adherence to the Bald Eagle Protection Act (16 U.S.C. 668-668d) which prohibits molesting or disturbing bald eagles, their nests, eggs, or young.

B. Guidelines for compliance to the Bald Eagle Protection Act are supervised by the U.S. Department of the Interior, Fish and Wildlife Service, Raptor Management Studies, 3000 Vintage Blvd, Suite 201, Juneau, Alaska 99801, phone (907) 586-7333 or (907) 586-7243. The contact person is Mike Jacobson, Eagle Management Specialist. The CONTRACTOR shall contact the Eagle Management Specialist for guidelines of the Bald Eagle Protection Act.

PART 2 - PRODUCTS (Not Used)

PART 3- EXECUTION (Not Used)

END OF SECTION

SECTION 316000

CONSTRUCTION SURVEYING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. The WORK under this Section includes providing all labor, materials, tools and equipment necessary to perform all surveying and staking necessary for the completion of the Project in conformance with the Drawings and Specifications and DEPARTMENT surveying practices, including all calculations required to accomplish the WORK.

B. The WORK shall include the staking, referencing and all other actions as may be required to preserve and restore land monuments and property corners which are situated within the Project area, and to establish monuments as shown on the Drawings. This WORK includes the referencing and resetting of CBJ Crow monument at corner of West 8th Street and Calhoun Avenue by a State of Alaska Registered Land Surveyor.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

3.01 CONSTRUCTION

A. All surveying involving property lines or monuments shall be done by, or under the direction of, a Registered Land Surveyor licensed in the State of Alaska.

B. The DEPARTMENT will supply information relative to the approximate locations of monuments and corners, but final responsibility for locations, referencing, and restoration shall rest with the CONTRACTOR.

C. In the event the CONTRACTOR does not replace the survey monuments and property corners disturbed by the CONTRACTOR's operations, the DEPARTMENT may, after first notifying the CONTRACTOR, replace the monuments in question. The cost of such replacements shall be deducted from payments to the CONTRACTOR.

D. The CONTRACTOR shall provide the DEPARTMENT with a copy of all surveyors' notes, if requested by the DEPARTMENT, prior to each Pay Request payment.

E. The CONTRACTOR shall provide the DEPARTMENT with a copy of all surveyors' notes, prior to the request for final payment, and include the information on the record drawings.

F. The CONTRACTOR shall obtain all information necessary for as-built plan production, from actual measurements and observations made by its own personnel, including Subcontractors, and submit this information to the DEPARTMENT.

G. The CONTRACTOR shall use competent, qualified personnel and suitable equipment for the layout work required and shall furnish all stakes, templates, straightedges and other devices necessary for establishing, checking and maintaining the required points, lines and grades.

H. The CONTRACTOR shall perform all staking necessary to layout the new concrete walls, pilasters, stairs, path, concrete sidewalk and other elements of WORK as defined in the Contract Documents to complete the Project.

I. Field notes shall be kept in standard bound notebooks in a clear, orderly and neat manner, consistent with DEPARTMENT surveying practices. The CONTRACTOR's field books shall be available for inspection by the DEPARTMENT at any time.

J. All field survey notes, including those which become source documentations from which quantities for payment are computed, shall be recorded by a notekeeper furnished by the CONTRACTOR. The notekeeper shall be thoroughly familiar with generally accepted standards of good survey notekeeping practice.

K. The DEPARTMENT may randomly spot-check the CONTRACTOR's surveys, staking and computations at the DEPARTMENT's discretion. After the survey or staking has been completed, the CONTRACTOR shall provide the DEPARTMENT with a minimum of 72 hours notice prior to performing any WORK, and shall furnish the appropriate data as required, to allow for such random spot-checking; however, the DEPARTMENT assumes no responsibility for the accuracy of the WORK.

END OF SECTION

SECTION 321216

ASPHALT CONCRETE PAVEMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. WORK consists of the furnishing and mixing of aggregate, asphalt cement, and additives at a mixing plant and the hauling, spreading, and compaction of the asphalt concrete mixture on a previously prepared surface, all as specified in the contract and in conformance with the lines, grades and thicknesses shown on the Drawing.

B. Asphaltic concrete mix for the parking lots, access roadway and sidewalks shall be Type II-A, Class B.

TABLE 321216-1

ASPHALTIC CONCRETE MIX REQUIREMENTS		
DESIGN PARAMETERS	CLASS A	CLASS B
Stability, lbs.	1,800	1,800
Flow, 0.01 inch (0.25 mm)	8-14	8-14
Voids in total mix, percent	3-5	2.5 – 4.0
Compactions, number of blows each side of test specimen	75	50
Dust-asphalt ratio (1)	0.6-1.0	0.6-1.0
Percent oil content	5.3-6.2	6.0% min.
Voids in the mineral aggregate (VMA) Minimum value		
Type I	13.0	12.0
Type II or IIA	14.0	13.0
Type III	15.0	14.0

(1) Dust-asphalt ratio is defined as the percent of material passing the U.S. No. 200 sieve divided by the percent of asphalt (calculated by weight of mix).

PART 2 - PRODUCTS

2.01 COMPOSITION OF ASPHALT CONCRETE MIXTURES - JOB MIX DESIGN

A. Asphalt concrete mixtures shall be composed of aggregate, asphalt cement, and required additives combined within the limits for the type and class specified in the contracts.

B. It is the CONTRACTOR's responsibility to ensure that, in addition to the aggregate gradation requirements, the aggregate material meets all the requirements of this Section and asphalt concrete mixture meets the applicable design parameters, when tested according to ATM T-17.

C. At least 15 days prior to the production of asphalt concrete pavement the CONTRACTOR shall submit a current mix design. The mix design shall be performed within six (6) months of the construction season. The following related items shall be submitted with the mix design:

1. Notification that aggregate proposed for the asphalt concrete mixture is available for sampling.
2. A letter stating the proposed gradation for the Trial Job Mix Design, gradations for individual stockpiles, and blend ratio for each aggregate stockpile.
3. A minimum of three (3) one-gallon samples of the asphalt cement proposed for use in the mixture, including name of product, manufacturer, test results as required, manufacturer's certificate of compliance, and a temperature viscosity curve for the asphalt cement.
4. A 1/2 pint sample of the anti-strip additive proposed, including name of product, manufacturer, and manufacturer's data sheet, and current Materials Safety Data Sheet (MSDS).
5. The CONTRACTOR shall accompany the DEPARTMENT during sampling, and shall furnish all the assistance needed to ensure that the DEPARTMENT obtains representative samples.
6. The mix design shall be 50 blow Marshall Method.

D. The DEPARTMENT will evaluate the gradation for the Trial Job Mix Design and suitability of the materials submitted. If the asphalt concrete mixture conforms to the design parameters specified in Table 321216-1 when tested according to ATM T-17, the DEPARTMENT will approve the Trial Job Mix Design and specify a target value for the asphalt cement content, mixing temperature and additives.

E. If the Trial Job Mix Design does not conform to the design parameters specified in Table 321216-1, when tested by the DEPARTMENT, the CONTRACTOR shall submit in writing to the DEPARTMENT another proposed gradation for a second Trial Job Mix Design. Samples of aggregate and additional asphalt cement shall be obtained in the same manner as for the original Trial Job Mix Design. The DEPARTMENT shall evaluate and test the second Trial Job Mix Design and either approve or disapprove the design based on the contract requirements. The above procedure shall be repeated until the Trial Job Mix Design is approved.

F. If the CONTRACTOR proposes a change in source of aggregate material, source of asphalt cement, or a change in the gradation target values after production has started, the CONTRACTOR shall submit in writing the proposed gradation target values to the DEPARTMENT and request a new Trial Job Mix Design be evaluated for approval. The CONTRACTOR shall accompany the DEPARTMENT during sampling and shall furnish all assistance needed to assure that the DEPARTMENT obtains representative samples. Approval of the new Trial Job Mix Design and/or aggregate material will require testing and evaluation. Trial Job Mix Design test results will be available within 15 calendar days of submittal. If the asphalt concrete mixture conforms to the design parameters specified in Table 321216-1 when tested in accordance with ATM T-17, the DEPARTMENT will develop a new target value for the asphalt cement content, mixing temperature and additives. The new target values for gradation and asphalt cement content will only be in effect on asphalt concrete mixture produced after the

CONTRACTOR submittal of the new gradation target values for the Trial Job Mix Design.

G. The location and type of the mixing plant shall be included with the Trial Job Mix Design data. Asphalt concrete mixtures produced from different plants shall not be mixed.

H. All trial job mix designs as required will be assessed and paid for by the CONTRACTOR.

2.02 ASPHALT AGGREGATES

A. Aggregate for Plant Mix Asphalt Pavement:

1. Coarse Aggregate: Coarse aggregate (that material retained on the No. 4 sieve) shall be crushed stone and shall consist of sound, tough, durable rock of uniform quality. Rock shall be free of schist that cleaves along preferred foliation planes. Rock shall be free of platy mineral grains. Metamorphosed rock shall be free of slaty cleavage. All material shall be free from clay balls, vegetable matter or other deleterious matters. Coarse aggregate shall not be coated with dirt or other finely divided mineral matter. All asphalt aggregates shall be fee of roots and wood. In addition, coarse aggregate shall meet the following requirements:

Nordic Abrasion Value	Nordic Abrasion Test Procedures[1]	16.0 Max.
Percent of Wear	AASHTO T 96	25 max.
Degradation Value	ATM T-13	30 min.
Percent Sodium Sulfate Loss	AASHTO T 104	10 max.
Percent Fracture	ATM T-4	100 min. single face/ 80 min. double face

1

2. Asphalt concrete aggregate shall not exceed eight percent thin - elongated pieces as determined by ATM T-9.
3. Fine Aggregate: Fine aggregate (passing the No. 4 sieve) shall meet the quality requirements of AASHTO M 29. Fine aggregate angularity shall be 40 minimum as determined by AASHTO T 304.
4. The several aggregate fractions for the mixture shall be sized, graded, and combined in such proportions that the resulting composite blend conforms to the grading requirements of Table 321216-2. Aggregates gradations shall be determined by ATM T-7, except when the sample is obtained by extraction.
5. Asphalt aggregate may be a blend but shall be 80% mechanically crushed with no more than 20% natural sand.

[1] Nordic Abrasion Test Procedures will apply to both the coarse and intermediate aggregate for asphalt aggregate. Test procedures for Nordic Abrasion are available at AKDOT&PF SE Region Materials Laboratory.

6. The material furnished shall conform to the approved Job Mix Design within the tolerances specified, except the limits given in Table 321216-2 may not be exceeded.

Sieve Size	Tolerance % Passing
¾ inch	100
½ inch	± 6
3/8 inch	± 6
No. 4	± 6
No. 8	± 6
No. 16	± 5
No. 30	± 4
No. 50	± 4
No. 100	± 3
No. 200	± 1

TABLE 321216-2

ASPHALT CONCRETE AGGREGATE Percent Passing by Weight				
Sieve Design	Type I	Type II	Type II-A	Type III
1-inch	100			
3/4 inch	80-95	100	100	
½ inch	60-88	80-95	86-98	100
3/8 inch	48-77	60-87	74-86	80-95
No. 4	28-63	36-48	46-58	44-81
No. 8	14-55	19-35	29-41	26-70
No. 16	9-46	10-25	18-28	16-59
No. 30	6-39	7-21	11-19	9-49
No. 50	5-29	5-20	6-14	6-36
No. 100	4-18	4-15	3-9	4-22
No. 200	2-6	2-6	2-6	2-6

2.03 ASPHALT MATERIALS

A. "The grade of asphalt cement material will be PG 58-22. The asphalt cement material shall conform to the applicable requirements of this Section and will be conditionally accepted at the source. If the material is to be conditionally accepted at the source, the CONTRACTOR shall provide a manufacture's certificate of compliance in accordance with this section and test results of the applicable quality requirements of this Section before the material is shipped. If there is a change in the source of the asphalt cement or if the kinematic viscosity (viscosity at 275°F) of the asphalt supplied for the Trial Job Mix Design by a factor of two (doubles or halves) or more, then operations shall be suspended while a new Trial Job Mix Design proposal is submitted for approval.

B. ASPHALT CEMENT

1. Asphalt cement shall be designated PG58-22 and conform to the requirements listed on the chart on the next page.

C. CUT-BACK ASPHALTS

1. Cut-back asphalts shall conform to the requirements of AASHTO M 81 and M 82 except as follows:

a. In Table 1 of M 82, reduce the minimum absolute viscosity on residue from distillation at 60ºC to 100, in the MC-30 and MC-250 columns, and revise the maximum distillate percentage by volume of total distillate at 225ºC for MC-30 to read: 35%.

TEST FOR	SPECIFICATIONS	AASHTO TEST METHOD	SPECIFICATIONS
Penetration	(4ºC [39.2ºF], 200g, 60s), dmm RTFO Aged Residue Note 1	T 49	15+
Ductility	(7.2ºC [45ºF], 1 cm/min), cm RTFO Aged Residue	T 51	10+
Absolute Viscosity	(60ºC [140ºF]), P Original Binders RFTO Aged Residue	T 202 T 202	1,100+ 1,500-6,000
Kinematic Viscosity	(60ºC [140ºF]), RTFO Viscosity/Orig. Viscosity	T 201	275+
Absolute Viscosity Ratio	(60ºC [140ºF]), RTFO Viscosity/Orig. Viscosity		4.0-
Flash Point, Cleveland Open Cup	C(F) Original Binder	T 48	232º+(450º+)
Solubility in Trichloroethylene	%, Original Binder	T 44	99.0+
Ductility	(25ºC [77ºF], 5 cm/min), cm RTFO Aged Residue	T 51	75+

Note 1 "RTFO Aged Residue" means the asphaltic residue obtained using the rolling thin film oven test (RTFO Test), AASHTO T 240.

D. EMULSIFIED ASPHALTS

1. CCS-1 cationic emulsified asphalts shall comply with the requirements listed in Table 321216-3.
2. CCS-1 Cationic Emulsified Asphalt shall conform to the requirements of AASHTO M 208.

TABLE 321216-3

TESTS ON EMULSION	
Viscosity @ 77ºF., SSF	30 max.
Storage Stability, 1 day, %	1 Max.
Demulsibility 35 ml. 0.8% SDS, %	25 min.
Particle Charge	Positive*
Sieve, % retained	0.10 max.
Distillation Oil by Vol. of Emulsion, %	5 max.
Distillation Residue by Wt. of Emulsion, %	45 min.
TESTS ON RESIDUE	
Penetration @ 77ºF.	100-200
Ductility @ 77ºF., 5 cm/min., cm	40 min.
Solubility in TCE, %	97.5 min.

* If particle charge test is inconclusive, material having a max. Ph value of 6.7 will be acceptable.

E. STORAGE AND APPLICATION TEMPERATURES

1. Asphalt materials required by the Specifications shall be stored and applied within the temperatures ranges indicated below:

TABLE 321216-4
STORAGE AND APPLICATION TEMPERATURES

Type and Grade of Material	Spray ºF	Mix ºF	Storage ºF
MC-30	85+		140 Max
MC-250	165+	165-220	240 Max
RC-800	200+		200 Max
CRS-2	125-175		100-175
CMS-2	125-175	120-160*	100-175
CSS-1	90-120	90-160*	50-125
AC-2.5	270+	235-280**	325 Max
AC-5	280+	250-295**	325 Max
AC-10	280+	250-315**	325 Max
STE-1	70-140	70-150	50-125
PG58-22		350 max	275-325°F

* Temperature of the emulsified asphalt in the pugmill mixture.
** As required to achieve Kinematic viscosity of 150-300 centistokes.

2.04 ANTI-STRIP ADDITIVES

A. Anti-strip agents shall be used in the proportions determined by ATM T-14 and shall be included in the approved Trial Job Mix Design. At least 70% of the aggregate shall remain coated when tested in accordance with ATM T-14.

2.05 PROCESS QUALITY CONTROL

A. The DEPARTMENT has the exclusive right and responsibility for determining the acceptability of all materials incorporated into the Project. It is expressly understood, however, that the CONTRACTOR is solely responsible for the sampling and testing of

material for process control of the asphalt concrete mixture including screening, crushing, blending, stockpiling of the aggregate and production of the asphalt concrete mixture and monitoring compaction of the asphalt concrete mixture.

B. The results of the acceptance testing performed by the DEPARTMENT may not be available to the CONTRACTOR until a period of at least seven working days has elapsed from the date of sampling.

PART 3 - EXECUTION

3.01 WEATHER LIMITATIONS

A. The asphalt concrete mixture shall not be placed on a surface with standing water, on an unstable roadbed when the base material is frozen, or when weather conditions prevent the proper handling or finishing of the mixture. No asphalt concrete, Type II, or Type III mixture, shall be placed unless the surface temperature is 40ºF or warmer.

3.02 EQUIPMENT

A. All equipment shall be in good working order and free of asphalt concrete mix buildup. All equipment shall be available for inspection and demonstration 72 hours prior to placement of asphalt concrete.

B. Bituminous Mixing Plants:

1. Mixing plants shall conform to AASHTO M 156.
2. Proportioning (batch) scales shall not be used for weighing material for payment. Weigh scales used in conjunction with a storage silo may be used to weigh the final product for payment, provided the scales are certified.

C. Hauling Equipment:

1. Trucks used for hauling asphalt mixtures shall have tight, clean, smooth metal beds which have been thinly coated with a minimum amount of either paraffin oil, lime water solution as approved by the DEPARTMENT. Diesel or fuel oil shall not be used.
2. Each truck shall have a watertight canvas cover of such size as to extend at least one foot over the sides and end of the truck bed and be adequately secured to protect the asphalt concrete mixture. The use of the canvas cover shall be at the DEPARTMENT's direction.

D. Asphalt Pavers:

1. Asphalt pavers shall be self-propelled units, provided with a heated vibratory screed. Grade and cross slope shall be controlled through the use of automatic grade and slope control devices. The paver screed control system shall be automatically actuated by the use of a string line, or minimum 30-foot long ski. The length of the string line shall be adjusted to produce the required surface smoothness.

2. The paver shall be equipped with a receiving hopper having sufficient capacity for a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed.
3. The screed assembly shall produce a finished surface of the required smoothness, thickness, and texture without tearing, shoving, or displacing the asphalt concrete mixture. Screed extensions used for paving a constant width shall be heated and vibrated. Auger extensions shall be the same length as the rigid screed extensions.
4. The use of a pickup machine to transfer the asphalt mixture from a windrow to the paver hopper will be permitted, provided the pickup machine is capable of collection of the windrowed material without damage to the underlying course. The DEPARTMENT will not allow the continued use of the pickup machine if segregation, excessive temperature loss, or any detrimental effects are observed.
5. Paver hopper wings shall either be left in the top or down position throughout the paving operation. If the CONTRACTOR wishes to dump the wings during paving, the material on the wings and in the hopper shall not be incorporated into the finish mat or included in the quantity for payment.
6. The screed assembly shall have a joint compaction device and a joint edge restrainer.

E. Rollers

1. The CONTRACTOR shall supply a sufficient number and weight of rollers to compact the mixture to the required density while maintaining the pace of the paving operations. Rollers shall be of the static steel wheel, vibratory steel wheel, and pneumatic tire type, self propelled and capable of reversing without backlash. They shall be specifically designated to compact hot asphalt concrete mixtures. The use of equipment which results in crushing of the aggregate will not be permitted. Pneumatic tire rollers shall be fully skirted; shall be at least six (6) feet wide; and shall be configured so that the rear group of tires align to cover the spaces between the front group of tires. The roller shall have an operating weight per tire of at least 3,000 pounds. Tires shall be of equal size, a minimum of 20 inches in diameter, shall be inflated to at least 80 psi and maintained so that tire pressures do not vary more than 5 psi between any two (2) tires

F. Sidewalks shall be paved with a pull box-type paver, as manufactured by Layton Manufacturing Co., or similar equipment. Heavy, self-propelled laydown units that will place concentrated loading on curb and gutter sufficient to cause breakage, or other damage to the concrete, will not be permitted.

3.03 PREPARATION OF EXISTING SURFACE

A. The existing surface shall be prepared in conformance with the Drawings and Specifications. Existing paved surfaces shall be cleaned of loose material by sweeping with a power broom, supplemented by hand sweeping, if necessary.

B. Contact surfaces of curbing, gutters, manholes, and other structures shall be coated with a thin, uniform coating of tack coat material in conformance with Section 321217 - Tack Coat prior to the asphalt mixture being placed.

C. Surfaces which have received a prime coat shall be allowed to cure such that the prime coat is not picked up by the haul vehicles. Surfaces which have received an emulsion tack coat shall be allowed to break prior to placement of asphalt concrete mixture.

D. The grading, shaping, and strengthening where applicable, of the road surface shall be as specified in Section 312003 - Base Course.

E. A string line installed by the CONTRACTOR at the direction of the DEPARTMENT will be the edges of paving.

F. Prior to paving over any existing pavement, the surface shall be thoroughly cleaned and an application of tack coat applied that will provide a strong bond between the two layers.

3.04 PREPARATION OF ASPHALT

A. A continuous supply of the asphalt cement shall be supplied to the mixer at a uniform temperature, within 25ºF of the Job Mix Design mixing temperature.

3.05 PREPARATION OF AGGREGATES

A. The aggregate for the asphalt concrete mixture shall be heated and dried to a temperature compatible with the mix requirements specified. Flames used for drying and heating shall be properly adjusted to avoid damage to the aggregate and to avoid the presence of unburned fuel on the aggregate. Any asphalt concrete mixture in which soot or fuel is present shall be wasted and no payment made.

B. Drying operations shall reduce the aggregate moisture content to the extent that the moisture content of the asphalt concrete mixture, sampled at the point of acceptance for asphalt cement content, shall be no more than 0.5% (by total weight of mix), as determined by ATM T-25.

3.06 MIXING

A. The aggregate, asphalt cement additives shall be combined in the mixer in the amounts required by the Job Mix Design.

B. The materials shall be mixed such that a complete and uniform coating of the aggregate is obtained. For batch plants, dry aggregate shall be placed in motion immediately prior to the addition of asphalt cement. Wet mixing time shall be adequate to obtain 98% coated particles when tested in accordance with AASHTO T 195.

C. The temperature of the asphalt concrete mixture at the time of the mixing shall be as determined by the Job Mix Design.

3.07 TEMPORARY STORAGE OF ASPHALT CONCRETE MIXTURE

A. Temporary storing or holding of hot asphalt concrete mixture in silo type storage bins will be permitted.

B. All the asphalt concrete mixture drawn from the silo type storage bins shall conform to all of the requirements for asphalt concrete mixtures as if loaded directly into hauling equipment from the mixing plant. Signs of visible segregation, heat loss, changes from the Job Mix Design, change in the characteristics of asphalt cement, lumpiness or stiffness of the mixture will be cause for rejection.

C. Unsuitable asphalt concrete mixture shall be disposed of by the CONTRACTOR at no cost to the DEPARTMENT.

3.08 SPREADING AND PLACING

A. The CONTRACTOR shall submit a Paving Plan for the DEPARTMENT's review a minimum of five (5) working days prior to initiating the paving operation. The Paving Plan shall consist of, but not be limited to, the following:

1. Paving schedule to include sequence of operations.
2. Paving schedule distributed to residents within the Project boundary.
3. Operational details to include:

    a. Plant operating capacity and target production rate.
    b. Number and capacity of trucks, cycle time, and delivery rate.
    c. The manufacturer and model of the paver and pickup machine, to include information on grade followers, sensors, operating speed and production rate of the pavers.
    d. Number, type, weight, and operating speed of rollers.
    e. Location of longitudinal joints.
    f. Method of constructing transverse joints.
    g. Construction plan for paving intersections and driveways.
    h. The manufacturers, model number, and the last certified calibration date for the CONTRACTOR's nuclear densometer gauge.

B. The asphalt concrete mixture shall be laid upon a surface approved by the DEPARTMENT, spread and struck off to the required compacted thickness. Asphalt pavers shall be used to distribute the asphalt concrete mixture in lanes of such widths as to hold to a practical minimum the number of longitudinal joints required, subject to the requirements of this Section.

C. When laying asphalt concrete mixtures, the paver shall be operated at uniform forward speeds consistent with the delivery of asphalt concrete mix to avoid unnecessary stopping and starting of the paver.

D. On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impracticable, the asphalt concrete mixture shall be spread, raked and luted by hand tools. For such areas the asphalt concrete mixture shall be placed to the required compacted thickness.

E. Any asphalt concrete mixture which is observed to be contaminated or segregated will be rejected.

F. When the section of roadway being paved is open to traffic, adjacent traffic lanes shall be paved to the same elevation within 24 hours unless prevented by weather or other factors beyond the CONTRACTOR's control.

G. When multiple lifts are specified in the contract, the final lift shall not be placed until all other lower lift pavement throughout that section, as defined by the Paving Plan, has been placed and accepted. Paving shall not begin until all adjacent curb has been poured and cured for 72 hours or until satisfactory strength is achieved.

H. Manholes, cleanouts and water valve boxes shall be raised to grade prior to paving the final lift. The structures shall have no less than 3/8" and no greater than 3/4" depression from adjacent asphalt to top of the lid. Manholes not meeting tolerances will be repaired as per Concrete Transition Slab detail shown in the Drawings.

I. Unless waived by the DEPARTMENT the asphalt pavement in the parking lots shall be paved in a single day's operation so no cold joints will result.

3.09 COMPACTION

A. Immediately after the asphalt mixture has been spread, struck-off and surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling.

B. Minimum compaction shall be 94% of AASHTO T 209. The target value for density will be 94 to 97% of the maximum specific gravity (MSG) as determined in accordance with AASHTO T 209 for the first sample from each lot of asphalt concrete mixture, as defined in this Section. Acceptance testing for field density will be determined in accordance with ATM T-18 or ASTM D-2950, as directed in writing by the DEPARTMENT.

C. The asphalt concrete mixture, including the leveling course, shall have a minimum of three (3) complete passes with a pneumatic-tired roller prior to cooling to 175ºF. A pass is defined as once over each point on the pavement surface.

D. Areas not accessible to the rollers shall be graded with rakes and lutes and compacted with mechanical tampers. For depressed areas a trench roller may be used to achieve the required compaction.

E. Any asphalt concrete mixture that becomes loose and broken segregated, mixed with dirt, or is any other way defective shall be removed and replaced with fresh hot asphalt concrete mixture, which shall be compacted to conform with the surrounding area. Any area showing an excess or deficiency of asphalt cement shall be removed and replaced.

F. Rollers or other vehicles shall not be parked or left standing on pavement that has not cooled sufficiently to prevent indentation by wheels.

3.10 JOINTS

A. Joints shall be made to ensure a continuous bond between old and new sections of the course. All joints shall present the same texture and smoothness as other sections of the course.

B. When joining old existing pavement and new pavement, the old pavement shall be cut in a neat line, with a power driven saw. All saw cuts on the Project shall be sealed with hot asphalt sealant.

C. Improperly formed joints resulting in surface irregularities or rock segregation shall be removed, full road width, replaced with new material, and thoroughly compacted. Rolling of joints after the material has cooled below 160ºF shall not be allowed. All pavement removal shall be precut to a neat line using a power driven saw.

D. A thin tack coat of asphalt cement or asphalt emulsion shall be applied on all cold joints prior to placing any fresh asphalt concrete mixture against the joint. This WORK shall be completed by the CONTRACTOR just prior to paving.

E. Transverse joints shall be formed by cutting back on the previous run to expose the full depth of the course or by using a removable bulkhead.

F. The longitudinal joints in one layer shall offset those in the layer immediately below by at least six (6) inches. The joints in the top layer shall be at centerline or lane lines except where pre-formed marking tape striping is required, in which case the longitudinal joint in the top layer shall be offset not more than one (1) foot.

G. The density at the joints shall not be more than 2% lower than the density specified in the lanes away from the joint.

H. Rolling at the longitudinal joint should be done from the hot side with a vibratory roller as soon as possible. The hot side should always overlap the cold side by 1 to 1.5 inches at the joint.

I. The finished asphalt surface along the edge of catch curb and gutter shall be ¼ inch above the top edge of the gutter pan.

J. All joints with existing asphalt pavement shall be resealed with PG 58-22 asphalt cement after the new pavement has cooled to ambient temperature. All joints with concrete gutters found to have a gap shall be blown out using a weed burner torch, filled with PG 58-22 asphalt cement and covered with a layer of dry sand. Excess sand shall be removed and asphalt cement placed on the concrete gutter more than one-inch from the edge of gutter shall be removed using solvent or other approving methods.

3.11 SURFACE TOLERANCE

A. The surface will be tested after final rolling at selected locations using a ten (10) foot straightedge. The variation of the surface from the testing edge of the straightedge between any two (2) contacts with the surface shall not exceed 3/16 inch. The asphalt concrete mixture in all defective areas shall be removed and replaced. All costs associated with removal and replacement of asphalt concrete mixture in the defective areas shall be borne by the CONTRACTOR.

B. All asphalt surfaces segregated with single large stones void of intermediate aggregate on the surface shall be removed and replaced full lane width. The surface particles shall be consistent and conform to the contract gradation.

3.12 PATCHING DEFECTIVE AREAS

A. Any asphalt concrete mixture that becomes contaminated with wood or foreign material or is in any way defective shall be removed. Defective materials shall be removed for the full thickness of the course. The pavement shall be saw cut so that the sides are perpendicular and parallel to the direction of traffic and so that the edges are vertical. Edges shall be coated with a thin tack coat material in accordance with Section 321217 – Tack Coat. Fresh asphalt concrete mixture shall be placed in sufficient quantity so that the finished surface will conform to grade and smoothness requirements. The asphalt concrete mixture shall be compacted to the density specified. No payment shall be made for material replacing defective material. All costs associated with the patching of defective areas shall be borne by the CONTRACTOR.

3.13 ACCEPTANCE SAMPLING AND TESTING

A. Asphalt concrete pavement will be accepted for payment based on the DEPARTMENT's approval of: the Job Mix Design; the materials; the placement and compaction of the asphalt concrete pavement to the specified depth, finished surface requirements, tolerances, and densities. Any area of finished surfacing that is visibly segregated, fails to meet surface tolerance requirements or specified thickness or densities, or is in any way defective, shall be removed and replaced with new asphalt concrete pavement. Removal and replacement of defective pavement shall be at no additional cost to the DEPARTMENT. The full depth of the new asphalt concrete mixture will be replaced: surface patching will not be allowed.

B. Acceptance sampling and testing shall be performed by the DEPARTMENT. Acceptance testing will determine whether the materials, installation and compaction efforts used by the CONTRACTOR have met these specifications. The results of the acceptance testing performed by the DEPARTMENT may not be available to the CONTRACTOR until a period of at least seven working days has elapsed from the date of sampling.

C. A lot will be the total asphalt placed on the Project per season. A sublot will be one Day's production on the Project. Each sublot shall be randomly sampled and tested in accordance with this Subsection for asphalt cement content, maximum specific gravity using the Rice Method, density, and gradation.

D. Samples taken for the determination of asphalt cement content and gradation will be taken from behind the screed prior to initial compaction. Asphalt cement content shall be determined by ATM T-23. The cost of this sampling (one per sublot) will be borne by the DEPARTMENT. The CONTRACTOR shall pay for additional testing if not in compliance.

E. ASTM D-2950 will be used to measure density. A minimum of six (6) random tests in locations determined by the DEPARTMENT will be taken from each sublot. When using ASTM D-2950, the MSG or laboratory pounds per cubic feet shall be determined by using the Rice Method, AASHTO T 209. The Rice Method, for the purposes of nuclear gauge compaction testing, replaces the Marshal Method. Acceptance testing for density will be completed by the DEPARTMENT in the following sequence:

1. The DEPARTMENT will randomly sample the in-place asphalt concrete mixture with a nuclear densometer gauge. Random is defined as having no specific pattern. Frequency of this testing will be determined. by the DEPARTMENT. The CONTRACTOR may request a re-test of any nuclear densometer sample not within Specification limits. The DEPARTMENT will select the sample location for the re-test. Only one (1) re-test per sample will be allowed. This acceptance testing will be paid for by the DEPARTMENT.
2. If the random density acceptance testing indicates that the density specified has not been met, further sampling and testing will be required by the DEPARTMENT. At the direction of the DEPARTMENT, the CONTRACTOR shall cut at least one (1) full depth six (6) inch diameter core sample (per lot) from the finished mat. The samples shall be neatly cut by a core drill at the randomly selected locations. Core holes for sampling shall be backfilled and compacted with hot asphalt concrete mixture within two (2) hours of sampling. The core samples will be tested for compliance with these specifications at a certified laboratory specified by the DEPARTMENT. Any sampling and testing required beyond the nuclear densometer testing by the DEPARTMENT will be paid by the CONTRACTOR.

F. At the direction of the DEPARTMENT, samples taken for the determination of aggregate gradation may be obtained from one (1) of the following locations:

1. From the combined aggregate cold feed conveyor via a diversion chute, or from the stopped conveyor belt.
2. For dry batched aggregates, on batch plants, the pugmill shall be cleaned by dry batching at least two (2) dry batches or until no asphalt coating is found on the aggregate. One complete batch will be dropped in a loader bucket and hand mixed thoroughly with a shovel until a sample can be taken. The sample will be used for acceptance, gradation, control, and payment.

G. Additional materials testing will be required whenever a new Trial Job Mix Design is approved. The maximum specific gravity (MSG) for each lot will be determined from the first randomly selected sample from the first sublot. Material testing includes, but is not limited to, gradations, extractions, density testing and core analysis.

H. If field density is determined in accordance with ASTM D-2950, additional core samples will be required whenever a new Trial Job Mix Design is approved or whenever there is a change in the typical section. The MSG for each lot will be determined from the first randomly selected sample from the first sublot. The CONTRACTOR shall reimburse the DEPARTMENT for all materials testing beyond the first $2,000.00. Material testing includes but is not limited to gradations, extractions, density testing and core analysis.

I. All tests necessary to determine conformance with the requirements specified in this Section will be performed by the DEPARTMENT and paid for by the CONTRACTOR.

J. The frequency of materials testing for asphalt is determined by the DEPARTMENT Materials Frequency Guide. The DEPARTMENT Inspector shall meet with the Project Manager prior to paving in order to determine the appropriate testing frequency. The latest edition of the Alaska Department of Transportation and Public Facilities Standard Specifications for Highway Construction shall be used and incorporated by reference herein.

END OF SECTION

SECTION 321217

TACK COAT

PART 1- GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. The WORK under this Section includes providing all labor, materials, tools and equipment necessary for furnishing and applying bituminous material to an existing asphalt surface to provide bond for a new asphalt wearing surface.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Asphalt material used for tack coat shall be STE-1 or CCS-1 Cationic Emulsified Asphalt, conforming to the requirements of the following table:

CCS-1/STE-1 CATIONIC EMULSIFIED ASPHALT

TESTS ON EMULSION	
Viscosity @ 77ºF., SSF	30 max.
Storage Stability, One (1) day, %	One (1) max.
Demulsibility 35 ml. 0.8% SDS, %	25 min.
Particle Charge	Positive *
Sieve, % retained	0.10 max.
Distillation Oil by Vol. Of Emulsion, %	Five (5) max.
Distillation Residue by Wt. Of Emulsion, %	45 min.
TESTS ON RESIDUE	
Penetration @ 77º F.	100-200
Ductility @ 77ºF., 5cm/min., cm	40 min
Solubility in TCE, %	97.5 min.

* If particle charge test is inconclusive, material having a maximum pH value of 6.7 will be acceptable.

Storage/Application	Spray ºF	Mix ºF	Storage ºF
Limitations for STE-1	70-140	70-150	50-125
Limitations for CCS-1	70-140	70-160	50-125

PART 3 - EXECUTION

3.01 EQUIPMENT

A. The CONTRACTOR shall provide equipment for heating and applying the Tack Coat.

3.02 CONSTRUCTION

A. The existing surface shall be patched, thoroughly cleaned, and free of irregularities to provide a reasonably smooth and uniform surface to receive the treatment. Unstable corrugated areas shall be removed and replaced with suitable patching materials. The edges of existing pavements, which are to be adjacent to new pavement, shall be cleaned to permit the adhesion of asphalt materials.

B. Tack Coat shall not be applied to a wet surface. Tack Coat shall be applied only when the air temperature is above 40ºF.

C. CSS-1 emulsified asphalt for tack coat shall be diluted with an equal amount of potable water at a temperature of between 50ºF and 102ºF and mixed for a minimum of 15 minutes before using.

D. Diluted emulsion shall be used within 48 hours after the water is added.

E. The diluted emulsion shall be uniformly applied with a pressure distributor at a rate of 0.05 to 0.10 gallons per square yard, as directed.

F. The Tack Coat shall be applied in such a manner as to offer the least inconvenience to traffic and to permit one-way traffic without pick-up, or tracking of the asphalt material.

G. Existing improvements such as the rigid conduit, power supply cable, concrete encasement and centerline light shall be protected to prevent contact with bituminous material. The Tack Coat shall be allowed to dry until it is in a proper condition of tackiness to receive the next course. The Tack Coat shall be applied only as far in advance of the next course placement as is necessary to obtain this proper condition of tackiness. Until the next course is placed, the CONTRACTOR shall protect the Tack Coat from damage.

H. STE-1 cationic asphalt shall not be diluted.

END OF SECTION

SECTION 321218

REMOVE EXISTING ASPHALT SURFACING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. The WORK under this Section includes providing all labor, materials, tools and equipment necessary to remove existing asphalt surfacing as shown on the Drawings, or as directed by the DEPARTMENT.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All materials shall conform to the requirements of the Specifications or to the requirements of the agency having jurisdiction over the pavement being replaced.

PART 3 – EXECUTION

3.01 GENERAL

A. Asphalt Pavement to be removed shall be neatly saw cut full depth along straight lines, with a tolerance of 0.1 feet in 50 feet and 0.2 feet in 100 feet. Only such pavement shall be removed as is necessary to excavate for the appurtenances, but the pavement shall be cut a sufficient distance outside the excavation to prevent damage to adjacent pavement by lifting or tearing the mat. All removed pavement shall be disposed off of the Project at an approved disposal site.

B. The CONTRACTOR shall deliver the removed asphalt surfacing material to an approved asphalt disposal site.

C. If the CONTRACTOR fails to comply with the provisions of any CBJ ordinance, State Statute or permit pertaining to waste disposal or disposal sites; the DEPARTMENT shall have the right, after giving 30 days written notice, to bring the disposal sites into compliance and collect the cost of the WORK from the CONTRACTOR, either directly or by withholding monies otherwise due under the contract.

END OF SECTION

SECTION 321313

SITE CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. The WORK under this Section includes providing all labor, materials, tools and equipment necessary for furnishing and installing portland cement concrete for site concrete structures in conformance with the Drawings and Specifications.

PART 2 - PRODUCTS

2.01 PORTLAND CEMENT

A. Portland cement shall conform to the requirements of AASHTO M 85.

B. Unless otherwise permitted by the DEPARTMENT, the product from only one mill and one brand and type of portland cement shall be used on the Project.

2.02 FINE AGGREGATE

A. Fine aggregate for portland cement concrete shall conform to the requirements of AASHTO M 6 with the following exceptions:

Delete section on deleterious substances and substitute the following:

The amount of deleterious substances shall not exceed the following limits:

Friable particles percent by weight	5 max.
Coal and Lignite, percent by weight using a liquid of 1.95 specific gravity (only material that is brownish-black shall be considered as coal or lignite)	0.5 max.
Material passing the No. 200 sieve, percent by weight	3.0 max.

Delete paragraph 4.2 of AASHTO M 6.

2.03 COARSE AGGREGATE

A. Coarse aggregate for portland cement concrete shall conform to the requirements of AASHTO M 80, class A, with the following exceptions:

Delete section on deleterious substances and substitute the following:

The amount of deleterious substances shall not exceed the following limits:

Coal and Lignite, percent by weight (only material that is brownish-black or black shall be considered coal or lignite) .....1.0 max.
Material passing the No. 200 sieve .....1.0 max
Thin-elongated pieces, percent by weight. (Length greater than five (5) times average thickness).....15 max.
Sticks and roots, percent by weight.....0.10 max.
Friable Particles, percent by weight .....0.25 max.
Maximum loss from AASHTO T 96 shall be 50 percent.
Maximum loss from AASHTO T-104 shall be 12 percent.

2.04 JOINT FILLERS

A. Joint filler, of the type designated in the contract, shall conform to the following:

1. Poured filler shall conform to AASHTO M 173 or AASHTO M 282 as specified.
2. Preformed fillers shall conform to AASHTO M 33 for bituminous type; AASHTO M 153 for sponge rubber (type I), cork (type II), and self-expanding cork (type III); AASHTO M 213 for nonextruding and resilient bituminous types and resilient bituminous types and AASHTO M 220 for pre-formed elastomeric types as specified.
3. AASHTO M 220 for preformed elastomeric types as specified. The filler shall be punched to admit the dowels where called for on the Drawings. Joint filler shall be furnished in a single piece for the depth and width required for the joint unless otherwise authorized by the DEPARTMENT. When more than one piece is authorized for a joint, the abutting ends shall be fastened securely, and held accurately to shape, by stapling or other positive fastening satisfactory to the DEPARTMENT.
4. Foam filler shall be expanded polystyrene filler having a compressive strength of not less than 10 psi.
5. Hot -poured sealants for concrete and asphaltic pavements shall conform to ASTM D 3405.
6. Hot-poured elastomeric type sealant for concrete pavements shall conform to ASTM D 3406.
7. Cold-poured silicone type sealant for concrete pavements shall conform to Federal Specification TT-S-1543, Class A. The sealant shall be a one part, low-modulus silicone rubber with an ultimate elongation of 1,200 percent.

2.05 CURING MATERIAL

A. Curing material shall conform to the following requirements as specified:

1. Burlap Cloth made from Jute Kenaf AASHTO M 182.
2. Sheet Material for Curing Concrete AASHTO M 171.
3. Liquid Membrane-Forming Compounds AASHTO M 148 for Curing Concrete, Type I.

B. The requirements specified in AASHTO M 148 covering "Liquid Membrane-Forming Compounds for Curing Concrete" are modified by adding the following:

1. Liquid membrane-forming compounds utilizing linseed oil shall not be used.

2.06 AIR ENTRAINING AGENTS

A. Air-entraining admixtures shall conform to the requirements of AASHTO M 154.

2.07 MIXING WATER

A. Unless otherwise permitted in writing by the DEPARTMENT, all water shall be obtained from the CBJ potable water system.

2.08 REINFORCING STEEL

A. Reinforcing shall conform to AASHTO M 31, and be of grade 60 or the grade designated on the Drawings or in the Specifications. Welded wire fabric shall conform to AASHTO M 55. Epoxy coated reinforcing bars shall conform to AASHTO M 284.

2.09 SHIPPING AND STORAGE OF CEMENT

A. Cement may be shipped from pretested approved bins. The cement shall be well protected from rain and moisture. Any cement damaged by moisture or which fails to meet any of the specified requirements shall be rejected and removed from the WORK.

B. Cement stored by the CONTRACTOR for a period longer than 60 days in other than sealed bins or silos shall be retested before being used. Cement of different brands, types, or from different mills shall be stored separately.

2.10 COMPOSITION OF CONCRETE

A. All portland cement concrete shall be ready-mix, provided by an approved plant regularly engaged in the production of concrete, unless otherwise authorized in writing by the DEPARTMENT. Ready-mix concrete shall conform to the requirements of AASHTO M 157.

B. The CONTRACTOR shall furnish the mix design to the DEPARTMENT for approval. The mix design shall be suitable for its intended use. Concrete shall be designed using an absolute volume analysis. The CONTRACTOR shall be responsible for having each mix design tested at a laboratory. Prior to the start of production of any mix design, the CONTRACTOR shall submit test results and certifications for all materials, detailed mix design data and results of laboratory tests to the DEPARTMENT for approval. Approval by the DEPARTMENT will be based on apparent conformity to these Specifications. It shall remain the CONTRACTOR's responsibility during production to produce concrete conforming to the mix design and the minimum acceptance criteria in the contract. When requested by the DEPARTMENT, the CONTRACTOR shall submit samples of all materials for verification testing. Production shall not commence until the mix design is approved by the DEPARTMENT.

C. Unless otherwise specified the design mix shall meet the following:

Minimum cement content	6 1/2 sacks (611 lb.) per C.Y.
Maximum water/cement ratio	5.75 gal/sack (0.51 #/#)
28-day compressive strength (fc)	as indicated on Drawings.
Slump	3" ± 1"
Entrained Air	3 to 6%
Coarse Aggregate	AASHTO M 43, Gradation No. 67

Cement factors are based on 94-pound sacks

D. The CONTRACTOR shall be responsible for producing and placing specification concrete with a cement content within a tolerance of two percent.

E. The use of superplasticizers in the concrete mix to improve the workability of mixes with low water cement ratios will require prior written approval by the DEPARTMENT.

F. The CONTRACTOR may, subject to prior approval in writing, use alternative sizes of coarse aggregate as shown in Table 1 of AASHTO M 43. If the use of an alternative size of coarse aggregate produces concrete which exceeds the permissible water-cement ratio above, thereby requiring additional cement above that specified, no compensation will be made to the CONTRACTOR for the additional cement.

2.11 SAMPLING AND TESTING

A. Field tests of all materials will be made by the DEPARTMENT when deemed necessary, in accordance with the applicable Specifications. When the results of the field tests indicate the material does not conform to the requirements of the Specifications, the re-tests required by the DEPARTMENT shall be at the CONTRACTOR's expense.

B. Materials which fail to meet contract requirements, as indicated by laboratory tests, shall not be used in the WORK. The CONTRACTOR shall remove all defective materials from the site.

C. Types and sizes of concrete specimens shall be in accordance with ASTM C 31. Additional slump tests and/or test cylinders may be required at the discretion of the DEPARTMENT. Should the analysis of any test cylinder not meet the preceding requirements of Article 2.10 (Composition of Concrete) its representative concrete shall be removed and replaced at the CONTRACTOR's expense.

D. Three copies of all test reports shall be furnished to the DEPARTMENT.

2.12 COLD WEATHER CONCRETE

A. Concrete shall not be placed when the descending air temperature in the shade, away from artificial heat, falls below 40°F. Placement of concrete shall not resume before the ascending air temperature reaches 35°F, without specific written authorization. When the air temperature falls below 40°F, or is, in the opinion of the DEPARTMENT, likely to do so within a 24 hour period after placing concrete, the CONTRACTOR shall have ready on the job materials and equipment required to heat mixing water and aggregate and to protect freshly placed concrete from freezing.

B. Concrete placed at air temperatures below 40°F shall have a temperature not less than 50°F nor greater than 70°F when placed in the forms. These temperatures shall be obtained by heating the mixing water and/or aggregate. Mixing water shall not be heated to more than 160°F.

C. Binned aggregates containing ice or in a frozen condition will not be permitted nor will aggregates which have been heated directly by gas or oil flame or heated on sheet metal over an open fire. When aggregates are heated in bins, only steam-coil or water-coil heating will be permitted, except that other methods, when approved, may be used. If live steam is used to thaw frozen aggregate piles, drainage times comparable to those applicable for washed aggregates shall apply.

D. When the temperature of either the water or aggregate exceeds 100°F, they shall be mixed together so that the temperature of the mix does not exceed 80°F at the time the cement is added.

E. Any additives must have prior approval of the DEPARTMENT before being used.

F. The use of calcium chloride is prohibited.

G. When placing concrete in cold weather, the following precautions shall be taken in addition to the above requirements:

1. Heat shall be applied to forms and reinforcing steel before placing concrete as required to remove all frost, ice, and snow from all surfaces which will be in contact with fresh concrete.
2. When fresh concrete is to be placed in contact with hardened concrete, the surface of the previous pour shall be warmed to at least 35°F, thoroughly wet, and free water removed before fresh concrete is placed.
3. When Type I or II cement is used, freshly placed concrete shall be maintained at a temperature of not less than 70°F for three days or not less than 50°F for five days. When Type III cement is used, freshly placed concrete shall be maintained at a temperature of not less than 70°F for two days or not less than 50°F for three days.
4. The above requirements are not intended to apply during the normal summer construction season when air temperatures of 40°F or higher can reasonably be anticipated during the two-week period immediately following concrete placement, or until the concrete is no longer in danger from freezing.

H. When temperatures below 20°F are not expected during the curing period and, in the opinion of the DEPARTMENT, no other adverse conditions, such as high winds, are expected, concrete temperatures may be maintained in thick concrete sections by retention of heat of hydration by means of adequately insulated forms.

I. When, in the opinion of the DEPARTMENT, greater protection is required to maintain the specified temperature, the fresh concrete shall be completely enclosed and an adequate heat source provided. Such enclosure and heat source shall be so designed that evaporation of moisture from the concrete during curing is prevented. Precautions shall be taken to protect the structure from overheating and fire.

J. At the end of the required curing period protection may be removed, but in such a manner that the drop in temperature of any portion of the concrete will be gradual and not exceed 30°F in the first 24 hours.

K. For concrete placed within cofferdams and cured by flooding with water, the above conditions may be waived provided that the water in contact with the concrete is not permitted to freeze. De-watering shall not be carried out until the DEPARTMENT determines that the concrete has cured sufficiently to withstand freezing temperatures and hydrostatic pressure.

L. The CONTRACTOR shall be wholly responsible for the protection of the concrete during cold weather operations. Any concrete injured by frost action or overheating shall be removed and replaced at the CONTRACTOR's expense.

2.13 FORMS

A. Forms shall be so designed and constructed that they may be removed without injuring the concrete.

B. Unless otherwise specified, forms for exposed surfaces shall be made of plywood, hard-pressed fiberboard, sized and dressed tongue-and-groove lumber, or metal in which all bolt and rivet holes are countersunk, so that a plane, smooth surface of the desired contour is obtained. Rough lumber may be used for surfaces that will not be exposed in the finished structure. All lumber shall be free from knotholes, loose knots, cracks, splits, warps, or other defects affecting the strength or appearance of the finished structure. All forms shall be mortar tight, free of bulge and warp, and shall be cleaned thoroughly before reuse.

C. In designing forms and falsework, concrete shall be regarded as a liquid. In computing vertical loads a weight of 150 pounds per cubic foot shall be assumed. The lateral pressure for design of wall forms shall not be less than that given by the following formulas:

For walls with R less than or equal to 7 feet per hour:

$$P=150+\frac{9000R}{T}$$, but not more than 2000 p.s.f. or 150 h, whichever is less.

For walls with R greater than 7 feet per hour:

$$P=150+\frac{43{,}400}{T}+\frac{2800R}{T}$$, but not more than 2000 p.s.f. or 150 h, whichever is less.

Where:

P = lateral pressure for design of wall forms, p.s.f.
R = rate of placement, feet per hour
T = temperature of concrete in forms, °F
h = maximum height of fresh concrete in form, feet.

D. The above formulas apply to internally vibrated concrete placed at 10 feet per hour or less, without the use of retarding agents, and where depth of vibration is limited to four feet below the top of the concrete surface. The CONTRACTOR shall state the placement rate and minimum concrete temperature on the working drawings for concrete form WORK. Deflection of plywood, studs, and walers shall not exceed 1/360 of the span between supports.

E. Forms shall be so designed that placement and finishing of the concrete will not impose loads on the structure resulting in adverse deflections or distortions.

F. The forms shall be so designed that portions covering concrete that is required to be finished may be removed without disturbing other portions that are to be removed later. As far as practicable, form marks shall conform to the general lines of the structure.

G. When possible, forms shall be day-lighted at intervals not greater than 10 feet vertically, the openings being sufficient to permit free access to the forms for the purpose of inspecting, and working.

H. Metal ties or anchorages within the forms shall be so constructed as to permit their removal to a depth of at least one inch from the face without injury to the concrete. All fittings for metal ties shall be of such design that, upon their removal, the cavities which are left will be of the smallest possible size.

I. All exposed edges 90° or sharper shall be chamfered 3/4 inch unless otherwise noted. Chamfering of forms for re-entrant angles shall be required only when specifically indicated on the Drawings.

J. Forms shall be inspected immediately prior to the placing of concrete. Dimensions shall be checked carefully and any bulging or warping shall be remedied and all debris and standing water within the forms shall be removed. Special attention shall be paid to ties and bracing and where forms appear to be braced insufficiently or built unsatisfactorily, either before or during placing of the concrete, the DEPARTMENT shall order the WORK stopped until the defects have been corrected.

K. Forms shall be constructed true to line and grade. Clean-out ports shall be provided at construction joints.

L. All forms shall be installed in accordance with approved fabrication and erection plans.

M. All porous forms shall be treated with non-staining form oil or saturated with water immediately before placing concrete.

N. Falsework shall be built to carry the loads without appreciable settlement. Falsework that cannot be founded on solid footings must be supported by ample falsework piling. Falsework shall be designed to sustain all imposed loads.

O. Detail drawings of the falsework shall be submitted for review, but such review shall not relieve the CONTRACTOR of any responsibility under the contract for the successful completion of the structure.

P. Forms and falsework shall not be removed without the consent of the DEPARTMENT. The DEPARTMENT's consent shall not relieve the CONTRACTOR of responsibility for the safety of the WORK. Blocks and bracing shall be removed at the time the forms are removed and in no case shall any portion of the wood forms be left in the concrete.

Q. To facilitate finishing, forms used on exposed vertical surfaces shall be removed in not less than 12, nor more than 48 hours, depending upon weather conditions.

PART 3 - EXECUTION

3.01 GENERAL

A. All concrete shall be placed before it has taken its initial set and, in any case, within 30 minutes after mixing. Concrete shall be placed in such a manner as to avoid segregation of coarse or fine portions of the mixture, and shall be spread in horizontal layers when practicable. Special care shall be exercised in the bottom of slabs and girders to assure the working of the concrete around nests of reinforcing steel, so as to eliminate rock pockets or air bubbles. Enough rods, spades, tampers and vibrators shall be provided to compact each batch before the succeeding one is dumped and to prevent the formation of joints between batches.

B. Extra vibrating shall be done along all faces to obtain smooth surfaces. Care shall be taken to prevent mortar from splattering on forms and reinforcing steel and from drying ahead of the final covering with concrete.

C. Concrete shall not be placed in slabs or other sections requiring finishing on the top surface when precipitation is occurring or when in the opinion of the DEPARTMENT precipitation is likely before completion of the finishing, unless the CONTRACTOR shall have ready on the job all materials and equipment necessary to protect the concrete and allow finishing operations to be completed.

D. Troughs, pipes, or short chutes used as aids in placing concrete shall be arranged and used in such a manner that the ingredients of the concrete do not become separated. Where steep slopes are required, troughs and chutes shall be equipped with baffle boards or shall be in short lengths that reverse the direction of movement. All chutes, troughs, and pipe shall be kept clean and free of hardened concrete by flushing thoroughly with water after each run. Water used for flushing shall be discharged clear of the concrete in place. Troughs and chutes shall be of steel or plastic or shall be lined with steel or plastic and shall extend as nearly as possible to the point of deposit. The use of aluminum for pipes, chutes or tremies is prohibited. When discharge must be intermittent, a hopper or other device for regulating the discharge shall be provided.

E. Dropping the concrete a distance of more than five (5) feet or depositing a large quantity at any point and running or working it along the forms will not be permitted. The placing of concrete shall be so regulated that the pressures caused by wet concrete shall not exceed those used in the design of the forms.

F. High frequency internal vibrators of either the pneumatic, electrical, or hydraulic type shall be used for compacting concrete in all structures. The number of vibrators used

shall be ample to consolidate the fresh concrete within 15 minutes of placing in the forms. In all cases, the CONTRACTOR shall provide at least two concrete vibrators for each individual placement operation (one may be a standby), which shall conform to the requirements of these Specifications. Prior to the placement of any concrete, the CONTRACTOR shall demonstrate that the two vibrators are in good working order and repair and ready for use.

G. The vibrators shall be an approved type, with a minimum frequency of 5,000 cycles per minute and shall be capable of visibly affecting a properly designed mixture with a one inch slump for a distance of at least 18 inches from the vibrator.

H. Vibrators shall not be held against forms or reinforcing steel nor shall they be used for flowing the concrete or spreading it into place. Vibrators shall be so manipulated as to produce concrete that is free of voids, is of proper texture on exposed faces, and of maximum consolidation. Vibrators shall not be held so long in one place as to result in segregation of concrete or formation of laitance on the surface.

I. Concrete shall be placed continuously throughout each section of the structure or between indicated joints. If, in any emergency, it is necessary to stop placing concrete before a section is completed, bulkheads shall be placed as the DEPARTMENT may direct and the resulting joint shall be treated as a construction joint.

J. The presence of areas of excessive honeycomb may be considered sufficient cause for rejection of a structure. Upon written notice that a given structure has been rejected, the rejected WORK shall be removed and rebuilt, in part or wholly as specified, at the CONTRACTOR's expense.

3.02 PUMPING CONCRETE

A. Concrete may be placed by pumping if the CONTRACTOR demonstrates that the pumping equipment to be used will effectively handle the particular class of concrete with the slump and air content specified and that it is so arranged that no vibrations result that might damage freshly placed concrete. The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced.

B. When pumping is completed, the concrete remaining in the pipeline, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients. After this operation, the entire equipment shall be thoroughly cleaned. Slump tests shall be taken at the discharge end of the pipe.

3.03 EXPANSION JOINTS

A. Expansion joints shall be located and formed as required on the Drawings.

B. Open Joints. Open joints shall be placed in the location shown on the Drawings and shall be formed. The form shall be removed without chipping or breaking the corners of the concrete. Reinforcement shall not extend across an open joint, unless so specified on the Drawings.

C. Filled Joints. Unless otherwise shown on the Drawings, expansion joints shall be constructed with pre-molded expansion joint filler with a thickness equal to the width of the joint.

D. The joint filler shall be cut to the same shape and size as the adjoining surfaces. It shall be fixed firmly against the surface of the concrete already in place in such manner that it will not be displaced when concrete is deposited against it.

E. Immediately after the forms are removed, the expansion joints shall be inspected carefully. Any concrete or mortar that has sealed across the joint shall be removed.

F. Joint sealer for use in deck joints shall be of the type shown on the Drawings conforming to the requirements of Article 2.4 (Joint Filler) of this Section. The faces of all joints to be sealed shall be free of foreign matter, paint, curing compound, oils, greases, dirt, free water, and laitance.

G. Elastomeric Compression Seals. The joint seal shall be shaped as shown on the Drawings. It shall be installed by suitable hand or machine tools and thoroughly secured in place with a lubricant-adhesive recommended by the seal manufacturer. The lubricant-adhesive shall cover both sides of the seal over the full area in contact with the sides of the joint.

H. The seal shall be in one piece for the full width of the joint. Any joints at curbs shall be sealed adequately with additional adhesive.

I. The seal may be installed immediately after the curing period of the concrete. Temperature limitations of the lubricant-adhesive as guaranteed by the manufacturer shall be observed.

J. Strip Seals. Expansion joint strip seals shall be as shown on the Drawings, and composed of a steel extrusion and an extruded strip seal. The steel shall conform to ASTM A242 or A588. Strip seals shall be one piece for the length of the joint.

K. Installation of the expansion joints shall be in accordance with the manufacturer's recommendations, except that the joint opening shall be adjusted for the dimensions indicated on the Drawings.

3.04 PIPES, CONDUITS, AND DUCTS

A. Pipes, conduits, and ducts that are to be encased in concrete shall be installed in the forms by the CONTRACTOR before the concrete is placed. Unless otherwise indicated, they shall be standard, lightweight cast-iron water pipe or wrought iron. They shall be held rigidly so they will not be displaced during concrete placement.

3.05 FINISHING CONCRETE SURFACES

A. All concrete surfaces exposed in the completed WORK shall receive an Ordinary Finish, as described below, unless otherwise noted on the Drawings or in the special provisions.

3.06 ORDINARY FINISH

A. An Ordinary Finish is defined as the finish left on a surface after the removal of the forms, the filling of all holes left by form ties, and the repairing of all defects. The surface shall be true and even, free from stone pockets and depressions or projections. All surfaces that cannot be satisfactorily repaired shall be given a Rubbed Finish.

B. The concrete in caps and tops of walls shall be struck off with a straightedge and floated to true grade. The use of mortar topping for concrete surfaces shall in no case be permitted.

C. As soon as the forms are removed, metal devices that have been used for holding the forms in place, and which pass through the body of the concrete, shall be removed or cut back at least one inch beneath the surface of the concrete. Fins of mortar and all irregularities caused by form joints shall be removed.

D. All small holes, depressions, and voids that show upon the removal of forms, shall be filled with cement mortar mixed in the same proportions as that used in the body of the WORK. In patching larger holes and honeycombs, all coarse or broken material shall be chipped away until a dense uniform surface of concrete exposing solid coarse aggregate is obtained. Feathered edges shall be cut away to form faces perpendicular to the surface. All surfaces of the cavity shall be saturated thoroughly with water, after which a thin layer of neat cement mortar shall be applied. The cavity shall then be filled with stiff mortar composed of one part portland cement to two parts sand, which shall be thoroughly tamped into place. The mortar shall be pre-shrunk by mixing it approximately 20 minutes before using. The length of time may be varied in accordance with brand of cement used, temperature, humidity, and other local conditions. The surface of this mortar shall be floated with a wooden float before initial set takes place and shall be neat in appearance. The patch shall be kept wet for a period of five days.

E. For patching large or deep areas, coarse aggregate shall be added to the patching material. All mortar for patching on surfaces which will be exposed to view in the completed structure shall be color matched to the concrete. Test patches for color matching shall be conducted on concrete that will be hidden from view in the completed WORK and shall be subject to approval.

3.07 RUBBED FINISH

A. When forms can be removed while the concrete is still green, the surface shall be pointed and wetted and then rubbed with a wooden float until all irregularities and form marks are removed and the surface is covered with a lather composed of cement and water. This lather shall be allowed to set for at least five days. The surface shall then be smoothed by being rubbed lightly with a fine carborundum stone. If permitted, a thin grout composed of one part cement and one part fine sand may be used in the rubbing.

B. If the concrete has hardened before being rubbed, a medium coarse carborundum stone shall be used to finish the surface. Such WORK shall not be done until at least four days after placing and it shall be done in the following manner:

1. A thin grout composed of one part cement and one part fine sand shall be spread over a small area of the surface. It shall be rubbed immediately with the stone until all form marks and irregularities are removed and the surface is covered with a lather. The surface shall then be finished as described above for green concrete.

C. The surface shall be smooth in texture and uniform in appearance. The building up of depressions will not be permitted.

D. If, through the use of first-class form materials and the exercise of special care, concrete surfaces are obtained that are satisfactory, the CONTRACTOR may be relieved entirely or in part from the requirements for a rubbed finish.

3.08 CURING CONCRETE

A. Water Curing:

1. All concrete surfaces shall be kept wet for at least seven (7) days after placement if Type I or II cement has been used or for three days if Type III cement has been used. Concrete shall be covered with wet burlap, cotton mats, or other materials meeting the requirements of AASHTO M 171 immediately after final finishing of the surface. These materials shall remain in place for the full curing period or they may be removed when the concrete has hardened sufficiently to prevent marring. The surface shall immediately be covered with sand, earth, straw, or similar materials.

2. In either case the materials shall be kept thoroughly wet for the entire curing period. All other surfaces, if not protected by forms, shall be kept thoroughly wet, either by sprinkling or by the use of wet burlap, cotton mats, or other suitable fabric, until the end of the curing period. If wood forms are allowed to remain in place during the curing period, they shall be kept moist at all times to prevent opening at joints.

B. Membrane Curing. Liquid membrane curing compound meeting the requirements of AASHTO M 148, Type I, may be permitted, subject to approval by the DEPARTMENT. Compounds utilizing linseed oil shall not be used. All finishing of concrete surfaces shall be performed to the satisfaction of the DEPARTMENT prior to applying the impervious membrane-curing compound. The concrete surfaces must be kept wet with water continuously until the membrane has been applied. The manufacturer's instructions shall be carefully followed in applying the membrane. In all cases, the membrane-curing compound must always be thoroughly mixed immediately before application. If the membrane becomes marred, worn, or in any way damaged, it must immediately be repaired by wetting the damaged area thoroughly and applying a new coat of the impervious membrane-curing compound. Membrane curing will not be permitted for concrete slabs that are to be covered with waterproof membranes, for polymer modified concrete or at construction joints.

3.09 BACKFILLING

A. Unbalanced backfilling against concrete structures will not be permitted until the concrete has attained a compressive strength of not less than 80% of the ultimate strength (f'_c) shown on the Drawings.

B. The compressive strength shall be determined from informational test cylinders cured on the site under similar conditions of temperature and moisture as the concrete in the structure.

3.10 CLEANING UP

A. Upon completion of the structure and before final acceptance, the CONTRACTOR shall remove all falsework. Falsework piling shall be removed or cut off at least two feet below the finished ground line.

END OF SECTION

SECTION 321314

CONCRETE STRUCTURES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. The WORK under this Section includes providing all labor, materials, tools, and equipment necessary for furnishing and installing concrete structures in accordance with these Specifications and in reasonably close conformity with the lines, grades, details, and locations shown on the Drawings or directed by the DEPARTMENT.

B. Civil Concrete Structures in this Project are concrete fence walls, concrete pilasters, concrete stairs and concrete sidewalks and slabs.

1.03 SUBMITTALS

A. Material Certificates: For each of the following, signed by manufacturer:

1. Form-release agents.
2. Joint filler for concrete sidewalk, curbs and site walls.
3. Reinforcing steel shop drawings.
4. Concrete mix design.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Portland Cement shall conform to the requirements of AASHTO M 85.

B. Aggregate shall be clean, durable, uniformly graded sand and gravel, or crushed stone, 100 percent passing a 1 1/2 inch sieve and containing not more than five percent passing a U.S. No. 200 sieve.

C. Air-entraining admixtures shall conform to the requirement of AASHTO M 154.

D. Water shall be obtained from the CBJ potable water system, unless otherwise permitted in writing by the DEPARTMENT.

E. Curing materials shall conform to the requirements of AASHTO M 182, AASHTO M 171, or AASHTO M 148, as appropriate, except that AASHTO M 148 is modified to prohibit the use of compounds utilizing linseed oil.

F. Reinforcing Steel shall conform to the requirements of AASHTO M 31.

G. Welded Wire Fabric shall conform to the requirements of AASHTO M 55.

H. Joint Fillers shall be of the type specified in the contract, and shall conform to the appropriate following requirements:

1. Poured filler shall conform to AASHTO M 173 or AASHTO M 282 as specified.
2. Hot-poured sealants for concrete and asphaltic pavements shall conform to ASTM D 3405, color gray.
3. Hot-poured elastomeric type sealant for concrete pavements shall conform to ASTM D 3406, color gray.
4. Cold-poured silicone type sealant for concrete pavements shall conform to Federal Specification TT-S-1543, Class A. The sealant shall be one part, low-modulus silicone rubber with an ultimate elongation of 1,200 percent, color gray.
5. Preformed fiber expansion joint fillers shall conform to AASHTO M 213 for non-extruding and resilient bituminous types.

2.02 COMPOSITION OF CONCRETE

A. Portland cement concrete will ordinarily be accepted on the basis of certification.

B. The concrete shall contain three to six percent of entrained air, as determined by AASHTO T 152. Concrete shall have a slump of not more than four inches as determined by AASHTO T 119.

C. Concrete shall contain not less than 611 pounds of cement and not more than 300 pounds of water per cubic yard.

D. The concrete shall develop a minimum compressive strength of 3,000 psi in 28 days.

E. The concrete shall be subject to acceptance or rejection by visual inspection at the job site. Re-tempering concrete will not be permitted.

F. The CONTRACTOR shall submit for approval the following:

1. The type and sources of aggregates and cement.
2. Scale weights of each aggregate proposed as pounds per cubic yard of concrete.
3. Quantity of water proposed as pounds per cubic yard of concrete.
4. Quantity of cement proposed as pounds per cubic yard of concrete.
5. Air content.
6. Slump.

G. When a commercial supplier is used, the CONTRACTOR shall furnish a certification with each truckload of concrete certifying that the material and mix proportions used are in conformance with the approved mixture.

H. Concrete complying with Section 321313 – Site Concrete will be acceptable as an approved mixture with appropriate certification.

I. The DEPARTMENT may make and test cylinders for strength determinations.

2.03 FORMS

A. Forms shall be designed and constructed to be removed without injuring the concrete. They shall be free of bulge and warp, and constructed so the finished concrete will be of the form and dimensions shown on the Drawings, and true to line and grade. Forms for concrete containing a retarding admixture shall be designed for a lateral pressure equal to that exerted by a fluid weighing 150 pounds per cubic foot.

PART 3 - EXECUTION

3.01 PLACING CONCRETE

A. Concrete shall be placed to avoid segregation of materials and shall be consolidated with mechanical vibrators in accordance with Section 321313 – Site Concrete.

B. When concrete is placed by the pumping method or by tremie operations, the use of aluminum pipe or conduit for transporting the concrete will not be permitted.

C. The intervals between delivery of batches for a single pour shall not exceed 30 minutes.

D. When placing concrete at or below an atmospheric temperature of 35 °F the CONTRACTOR shall comply with the applicable requirements of Section 321313 – Site Concrete.

3.02 FINISHING CONCRETE SURFACES

A. All concrete surfaces, except exposed glass, shall have an ordinary finish in accordance with the requirements of Section 321313 – Site Concrete, except "Concrete International Corporation" Ashford formula shall be used as a curing compound.

3.03 CURING CONCRETE

A. All concrete will be cured a minimum of seven days, or, if high early strength cement is used, a minimum of three days. The concrete shall be cured in accordance with Section 321313 – Site Concrete.

3.04 AS-CAST FORMED FINISHES

A. Rubbed Finish: Apply the following to smooth-form-finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborumdum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

3.05 CONCRETE PILASTERS

A. Concrete pilasters shall conform to the Concrete Pilaster Detail shown in the Drawings and shall be constructed with concrete achieving a minimum compressive strength of 3,000 psi at 28 days.

B. Finishing of the concrete pilaster shall be an ordinary finish. All exposed concrete surfaces will receive Ashford curing compound.

3.06 CONCRETE ACCESS PAD, 6-INCHES THICK, WITH DETECTABLE TILES

A. Concrete sidewalk segments, for access pads, shall be constructed as shown on the Drawings at access ramp locations. The concrete pads shall be graded to a 2% maximum slope and shall be 6-inches thick. Detectable tiles shall be installed at each ramp to the dimensions and locations shown on the Drawings. Detectable tiles shall be "Inline Dome-Paver Tiles" from "ADA Solutions," or approved equal. Installation of the detectable tiles shall be in accordance with the manufacturer's recommendations.

3.07 CONCRETE FENCE WALLS

A. Concrete Fence Walls shall conform to the dimensions shown in the Drawings and shall be constructed with concrete achieving a minimum compressive strength of 3,000 psi after 28 days.

B. Finishing of the concrete fence wall surfaces shall be an ordinary finish. All exposed concrete surfaces will receive Ashford curing compound.

3.08 CONCRETE STAIRS

A. Concrete Stairs shall conform to the dimensions shown in the Drawings and shall be constructed with concrete achieving a minimum compressive strength of 3,000 psi after 28 days.

B. Finishing of the Concrete Stairs surfaces shall be an ordinary finish. All exposed concrete surfaces will receive Ashford curing compound.

END OF SECTION

SECTION 321315

SIDEWALK, CURB AND GUTTER

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. The WORK under this Section includes providing all labor, materials, tools, and equipment necessary for furnishing and installing thickened edge, sidewalks with turned up wall as shown on the Drawings.

1.03 SUBMITTALS

A. Samples: For each of the following materials:

1. Sidewalk joint filler.

B. Construction Joint Layout: Indicate proposed construction joints as indicated in the Drawings and required to construct the Project.

1. Location and layout of joints is subject to the approval of the DEPARTMENT.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials shall conform to the requirements of Section 321313 – Site Concrete, except "Concrete International Corporation" Ashford Formula, or approved equal, shall be used instead of the specified curing materials.

B. Synthetic fibers shall be used for reinforcement with curb and gutter and concrete sidewalk replacements.

C. Joint fillers shall conform to requirements of Section 321313 – Site Concrete.

D. Synthetic fibers shall be added to concrete at the batch plant with the types and weights as follows:

1. Sidewalk – Fibermesh 300, as manufactured by "SI Concrete Systems," or approved equal, at 1.5 pounds per cubic yard of concrete.

PART 3 - EXECUTION

3.01 METHODS OF CONSTRUCTION

A. Sidewalk, concrete slabs, curb and gutter shall conform to the applicable requirements of Section 321313 – Site Concrete, and as shown on the Drawings, except "Concrete International Corporation" Ashford formula, or approved equal, shall be used as a curing compound.

1. The curing compound shall be sprayed on the surface with a low-pressure sprayer immediately following the finishing operation.
2. The entire surface shall be kept wet for 30 minutes by brooming excess material onto the dry spots or by re-spraying them immediately. No areas on the concrete surface shall be allowed to dry during the initial 30 minute period.
3. As the curing compound begins to dry into the surface and becomes slippery, lightly sprinkle the surface with water to aid the penetration of the curing compound and to bring any alkali to the surface.
4. After 30 to 40 minutes, squeegee or broom the surface to remove any excess curing compound and alkali or other impurities brought to the surface. All WORK required for the application of the curing compound shall conform to the manufacturer's recommendations.

B. All exposed or unprotected edges of sidewalks shall be tooled to a radius of not more than one-half inch. After floating, trowel finish the entire surface using steel trowels. Final finish shall be obtained by brooming the surface, including the tooled edge, to a gritty finish after all free moisture has disappeared from the surface. Sprinkling of cement or sand for blotting will not be permitted.

C. Concrete curb and gutter shall be integral, one course construction, and molded in place on a compacted base course. The face forms of the integral curb and gutter shall be removed as soon as practicable. The top and inclined surface shall then be worked with float or steel trowels to a gritty finish. Glazing, sprinkling of sand or cement, or blotting will not be permitted. Both front and back edges shall be tooled to a radius of one-half inch.

D. Expansion joints shall be placed at a maximum of 30-foot intervals, along all structures and about all features that project into, through, or against the concrete. An expansion joint shall be constructed at the intersection of sidewalks and at the beginning and end of curb returns. Expansion joints shall not be placed between the sidewalk and the curb.

E. Expansion joint material shall conform to the requirements of AASHTO M 213. This material shall extend the full width of the structure and shall be cut to such dimensions that the base of the expansion joint shall extend to the subgrade and the top shall be depressed not less than one-quarter inch nor more than one-half inch below the finished surface of the concrete. The material shall be one piece in the vertical dimension and shall be securely fastened to the existing concrete face against which fresh concrete is to be poured.

F. Joints shall be cleared of all gravel and loose material. Joint surfaces shall be kept clean and dry during sealing. Sealing shall be done in accordance to manufacturer's recommendations. Sealant placed incorrectly shall be removed and replaced at the CONTRACTOR's expense.

G. Transverse contraction joints, cut to a depth of ¼ of the slab thickness prior to the final set of the concrete. The joints shall be tooled in the sidewalk as shown on the Drawings. Where the sidewalk adjoins the curb (parallel to it), contraction joints in the sidewalk and curb shall be made to match where practicable.

H. The top and face of the finished thickened edge sidewalk shall be true and straight, free from lumps, sags, or other irregularities. When a straightedge 10 feet long is laid on the top face of the sidewalk, the surface shall not vary more than 0.02 foot from the edge of the straightedge except at grade changes or curves. All discolored concrete shall be cleaned at the CONTRACTOR's expense. The concrete may be cleaned by abrasive blast cleaning or other methods approved by the DEPARTMENT. Repairs shall be made by removing and replacing the entire unit between scoring lines or joints.

END OF SECTION

SECTION 321316

REMOVE EXISTING SIDEWALK, CONCRETE SLAB, STAIRS AND WALLS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. The WORK under this section includes providing all labor, materials, tools, and equipment necessary for removing and disposing of existing concrete sidewalks, concrete slabs, concrete walls and footings, including existing masonry rocks and concrete stairs, as indicated on the Drawings or as directed by the DEPARTMENT.

B. The WORK also includes the removal and disposal of existing wooden fence including fence posts, concrete footings and all hardware as shown on the Drawings or as directed by the DEPARTMENT.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 CONSTRUCTION

A. Sidewalks, concrete slabs, concrete walls and footings, and concrete stairs to be removed shall be separated from the remaining portion by saw cutting. Saw cuts shall be at right angles to the sidewalk, slab edge or wall edge. Broken edges shall be trimmed to eliminate jagged or irregular surfaces. The CONTRACTOR shall dispose of the material at an approved disposal area.

B. The CONTRACTOR is responsible to secure disposal sites, including obtaining written permission from the owner and any required permits, if none are indicated on the Drawings. The cost of securing such sites shall be borne by the CONTRACTOR.

END OF SECTION

SECTION 031400 - STONE PAVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following pavers and related materials:

1. Stone Pavers for Path
2. Bedding and Joint Sand
3. Edge Restraints.

B. Related Sections include the following:

1. City and Borough of Juneau Standard Specifications

1.3 REFERENCES

A. The following references pertain to this section.

1. American Society of Testing and Materials (ASTM) (latest edition):
2. C 136 Method for Sieve Analysis for Fine and Coarse Aggregate.
3. C 144 Specification for Natural and Manufactured Sands
4. D 698 Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 5.5 lb Rammer and 12 in. drop.
5. D 1557 Test Methods for Moisture Density Relations of Soil and Soil Aggregate Mixtures Using a 10-lb Rammer and 18 in. drop.
6. D 2940 Graded Aggregate Material for Bases or Subbases for Highways or Airports.

1.4 QUALITY ASSURANCE

A. Installation shall be by a Contractor and crew with at least five years of experience in placing interlocking natural stone and concrete pavers on projects of similar nature or dollar cost.

B. The CONTRACTOR shall conform to all local, state/provincial licensing and bonding requirements.

1.5 SUBMITTALS

A. Shop or product Drawings and product data shall be submitted.

B. Full size samples of stone paving units shall be submitted to indicate color and shape selections. Colors shall be as indicated on the Drawings.

C. Sieve analyses for grading of bedding and joint sand shall be submitted.

D. Test results shall be submitted from an independent testing laboratory for compliance of paving unit requirements to ASTM C 936 or other applicable requirements.

E. The layout, pattern, and relationship of paving joints to fixtures and project formed details shall be indicated.

F. Samples for Verification. Provide minimum 12-inch length sample and one stake for:

1. Edge restraints and spikes.

1.6 MOCK-UPS

A. 12-foot x 6-foot paver area shall be installed for each type/pattern of paved area as described in Article 3.2. This area can be used to determine the amount that the pavers settle into the bedding sand after compaction, joint sizes, lines, laying pattern(s), color(s) and texture of the Project. This area shall be the standard from which the WORK will be judged. Unsatisfactory mock-ups shall be removed and reinstalled until deemed acceptable and approved.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Pavers shall be delivered to the site in steel banded, plastic banded, or wood crates capable of transfer by fork lift or clamp lift. The pavers shall be unloaded at the job site in such a manner that no damage occurs to the product.

B. Bedding and joint sand shall be covered with a secure waterproof covering to prevent exposure to rainfall or removal by wind.

C. Delivery and paving schedules shall be coordinated in order to minimize interference with normal use of buildings adjacent to paving.

1.8 ENVIRONMENTAL CONDITIONS

A. Sand or pavers shall not be installed during heavy rain or snowfall.

B. Sand and pavers shall not be installed over frozen base materials.

C. Frozen bed sand and joint sand shall not be installed.

PART 2 - MATERIALS

2.1 STONE PAVERS

A. Stone pavers shall be sound natural quarry run Mountain Gold Flagstone, or approved equal.

B. Paver shape, color, and thickness shall be as follows:

1. Paver Field:

   a. Colors: Color and texture of rock to be approved by Landscape Architect prior to fabrication.
   b. Thickness: 1-1/2 to 2 inch
   c. Range of Sizes: 6"x6" to 18"x24" irregular flagstone
   d. Pattern: Random.

2. Paver Edging:

   a. Colors: Color and texture of rock to be approved by Landscape Architect prior to fabrication.
   b. Thickness: 4 inch
   c. Sizes: 6 x12 inch stone blocks
   d. Pattern: Soldier course, butt to butt

2.2 BEDDING SAND

A. Provide bedding as follows:

1. Washed, clean, non-plastic, free from deleterious or foreign matter, symmetrically shaped, natural or manufactured from crushed rock.
2. Do not use limestone screenings, stone dust, or sand for the bedding sand material that does not conform to conform to the grading requirements of ASTM C33.
3. Do not use mason sand or sand conforming to ASTM C 144 for the bedding sand.
4. Where concrete pavers are subject to vehicular traffic, utilize sands that are as hard as practically available.
5. Sieve according to ASTM C 136.

B. Bedding Sand Material Requirements: Conform to the grading requirements of ASTM C 33 with modifications as shown in Table 1.

TABLE 1
GRADING REQUIREMENTS FOR BEDDING SAND
ASTM C 33

Sieve Size	% Passing
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	95 to 100

No. 8 (2.36 mm)	85 to 100
No. 16 (1.18 mm)	50 to 85
No. 30 (0.600 mm)	25 to 60
No. 50 (0.300 mm)	10 to 30
No. 100 (0.150 mm)	2 to 10
No. 200 (0.075 mm)	0 to 1 max.

2.3 JOINT SAND

A. Provide joint sand as polymeric sand as follows:

1. Polymeric sand shall be Polymeric Sand HP as manufactured by Techniseal, or approved equal.
2. Polymeric sand shall be comprised of graded sand (ASTM C-144) and polymer binders in sealed and labeled containers.
3. Provide color of polymeric sand to best match colors of paver for each paving pattern.
4. Joint Sand Material Requirements: Conform to the grading requirements of ASTM C 144 as shown with modifications in Table 2 below:

TABLE 2
GRADING REQUIREMENTS FOR JOINT SAND
ASTM C 144

Sieve Size	ASTM C 144 Natural Sand Percent Passing	ASTM C 144 Manufactured Sand Percent Passing
No. 4 (4.75 mm)	100	100
No. 8 (2.36 mm)	95 to 100	95 to 100
No. 16 (1.18 mm)	70 to 100	70 to 100
No. 30 (0.600 mm)	40 to 75	40 to 100
No. 50 (0.300 mm)	10 to 35	20 to 40
No. 100 (0.150 mm)	2 to 15	10 to 25
No. 200 (0.075 mm)	0 to 1	0 to 10

2.4 SONE PAVING CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar and grout stains, efflorescence, and other new construction stains from stone surfaces without discoloring or damaging surfaces; expressly approved for intended use by cleaner manufacturer and stone supplier and safe to use with polymeric sands.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Diedrich Technologies, Inc.

b. Dominion Restoration Products.
c. EaCo Chem, Inc.
d. Hydrochemical Techniques, Inc.
e. Prosoco, Inc.

2.5 STONE PAVING SEALER

A. Sealer shall be a clear, penetrating sealer and water repellent for exterior stone use.

1. Product shall be Fabrikem, Fabrishield #760, or approved equal.

2.6 EDGE RESTRAINTS

A. Aluminum Edge Restraints: Manufacturer's heavy-duty, aluminum alloy 6061 with a T-6 hardness, L-shaped, 3/16-inch- thick by 3 inches wide and 4 inches high extruded-aluminum edging. Edging to have holes to receive spikes 4-inches on center. Edging with tabs on the face and stakes are not to be used. Edging to accept a 3-inch aluminum splicer inserted 1-1/2 inches into each adjoining section shall be used to create an uninterrupted edging system that has a continuous support surface on both sides of the vertical wall.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Brickstop Corporation.
b. Curv-Rite, Inc.
c. Permaloc Corporation.
d. Sure-loc Edging Corporation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that the subgrade preparation, compacted density, and elevations conform to the specifications.

B. Verify that aggregate base materials, thickness compaction, surface tolerances, and elevations conform to the Specifications.

C. Verify that the base is dry, uniform, even, and ready to support sand, pavers, and imposed loads.

D. Beginning of bedding sand and paver installation means acceptance of base and edge restraints.

3.2 SITE PREPARATION

A. The site must be stripped of all topsoil and other objectionable materials to the grades specified.

B. All subdrainage of underground services within the paving area must be completed in conjunction with subgrade preparation and before the commencement of subbase construction. All service trenches within the pavement area must be back filled to the sub- grade level with approved material placed in uniform lifts not exceeding 4 inch loose thickness. Each lift must be compacted to at least 100 percent Standard Proctor Maximum Dry Density as specified in ASTM 698.

C. After trimming to the grades specified, the subgrade is to be proof-rolled to 95 percent Standard Proctor Maximum Dry Density (ASTM 698), with soft spots or localized pockets of objectionable material excavated and properly replaced with approved granular material.

D. Under no circumstances shall further pavement construction proceed until the subgrade has been inspected by the Engineer.

E. Place separation geotextile over prepared subgrade, overlapping ends and edges at least 12 inches.

F. Place aggregate subbase and base, compact by tamping with plate vibrator, and screed to depth indicated.

G. Place aggregate subbase and base, compact to 100 percent of ASTM D 1557 maximum laboratory density, and screed to depth indicated.

H. The Contractor shall ensure that the prepared subgrade is protected from damage from inundation by surface water. No traffic shall be allowed to cross the prepared subgrade. Repair of any damage resulting shall be the responsibility of the Contractor and shall be repaired.

3.3 INSTALLATION, GENERAL

A. Do not use stones with visible chips, cracks, voids, discolorations, or other defects that might be reduce the structural component of the stone.

B. All stones shall have an even face without voids, protrusions or other elements that may be a trip hazard. Use best side up.

C. Mix stones from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.

D. Cut stones with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut stones to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Pavers to be placed along the edge shall be cut with a masonry saw. Cutting pavers in place with a cutoff saw is prohibited. See ADOT&PF and CBJ Standard Specification for noise and dust control requirements. Hammer cutting is not acceptable.

E. Joint Tolerances: Install stone paving in the patterns indicated on Drawings with the following joint tolerances:

1. Edging Stone: 1/4-inch average joint width, butt to butt. Stones are to be miter cut at the same angle as the adjacent paver to match the radius of curves. Joints are to be cut to the center point of each arc and be uniform.

2. Random Flagstone: ½-inch average joint width with a maximum of 3/4-inch.

F. Horizontal Tolerances: Do not exceed 1/16-inch unit-to-unit offset from flush (lippage) or 1/8-inch in 24 inches from level, or indicated slope, for finished surface of paving.

3.4 EDGE RESTRAINT INSTALLATION

A. Provide edge restraints as indicated. Install edge restraints before placing stone pavers.

B. Install edge restraints to comply with manufacturer's written instructions. Install 3/8" by 10-inch steel spikes at intervals required to hold edge restraints in place (12-inch on-center minimum) during and after unit paver installation.

C. Install edging with even and smooth curves without abrupt changes in layout.

D. Make good all subbase and base material that may have been disturbed due to edging installation.

E. Receive approval of Landscape Architect once edge restraint has been installed. Do not proceed with paver installation until edging is approved.

3.5 STONE PAVER INSTALLATION

A. The leveling sand course shall be spread evenly over the base course and screeded to a nominal 1-inch thickness, not exceeding 1-1/2 inch thickness. The leveling sand should not be disturbed and moisture content is to remain constant and density loose and uniform until pavers are set and compacted. Sufficient sand shall be placed in order to stay ahead of the laid pavers. Bedding sand shall not be used to fill depressions in the base surface.

B. Treat leveling course with herbicide to inhibit growth of grass and weeds.

C. Clean all stone pavers prior to installation. All pavers shall be free of foreign material before installation.

D. Pavers shall be inspected for uniform color distribution and all chipped, cracked, uneven, damaged or discolored stone pavers shall not be used.

E. Stone pavers shall be laid in patterns indicated with best side up creating a smooth even walking surface meeting the tolerance indicated.

F. Place and shape pavers as necessary to maintain joint tolerances. The use of whole units is preferred over cut units.

G. The paver surface shall be swept clean of all debris before compacting, in order to avoid damage from point loads.

H. A low amplitude, high frequency plate compactor shall be used to compact the stone pavers into the sand.

I. The pavers shall be compacted and dry polymeric joint sand swept into all joints until the joints are full, approximately two or three passes with the compactor. Do not compact within 3-feet of the unrestrained edges of the paving units. Follow manufacturer's recommendations for the application of polymeric joint sand including moisture requirements.

J. All WORK to within 3-feet of the laying face must be left fully compacted with joint sand-filled joints at the completion of each day.

K. Excess joint sand shall be swept off when the job is complete.

L. The final surface elevations shall not deviate more than heights indicated.

M. The final surface elevation of pavers shall be 1/8 inch above adjacent concrete curbs, concrete collars or channel to allow for setting.

3.6 STONE PAVER CLEANING AND JOINT SEALER APPLICATION

A. All stone pavers shall be cleaned prior to sealing. Apply stone cleaner per manufacturer's instructions. Apply stone and joint sealer to all pavers, per manufacturer's instructions.

3.7 FIELD QUALITY CONTROL

A. Final elevations shall be checked for conformance to the Drawings after removal of excess joint sand.

B. Upon completion of the WORK, clean up all WORK areas by removing any debris, surplus material, and equipment from the site.

END OF SECTION 031400

SECTION 323001

SIGN ASSEMBLY

PART 1- GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. The WORK under this Section includes providing all labor, materials, tools, and equipment necessary for removing existing telspar sign posts and sign panels and reinstalling the sign assemblies after new wall installation is complete as shown on the Drawings.

PART 2 - PRODUCTS

2.01 GENERAL

A. Existing sign panels and sign posts shall be removed, salvaged and reinstalled.

PART 3 - EXECUTION

3.01 GENERAL

A. Existing sign panels and sign posts shall be salvaged by the CONTRACTOR and reinstalled after construction of the new walls at locations shown on the Drawings. The CONTRACTOR shall reference the location of the existing signs prior to beginning construction to ensure the signs are reinstalled in their correct location.

B. All "NO PARKING" signs shall be turned 30º to 45º with the line of traffic flow to be visible to approaching traffic.

END OF SECTION

SECTION 323119 - ORNAMENTAL METAL FENCES AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Steel and iron decorative fence and gates
2. Gate hardware
3. Card Readers, Intercoms and other devices
4. Ornamental fence and gate medallions

1.3 PERFORMANCE REQUIREMENTS

A. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 SUBMITTALS

A. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

B. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear fence/ gate member, including handrails, top rails, posts, and balusters.
2. Fittings and brackets.
3. Welded connections.
4. Assembled Samples of fence/ gate systems, made from full-size components, including rails, posts, and infill.
5. Show method of finishing members at intersections. Samples need not be full height.

C. Ornamental Fence and Gate Medallions: For each design shown, provide the following for approval.

1. Artistic sketch of each casting shown including approximate dimensions
2. Images of clay model casting based on approved sketch. Images of model to show a full range of angles to allow complete review
3. One complete casting of each design, including attachment method of approved clay model.

D. Welding certificates.

E. Product Data: For each type of gate hardware indicated. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, colors, field-assembly requirements, and installation details.

F. Product Data: Alloy and ingot certification of metals for fence and gate medallions.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of fence/ gate from single source from single manufacturer.

B. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

C. Manufacturer Requirements: Fence and gate manufacturer shall meet the following:

1. "Made In America" where all materials and the product is entirely produced, manufactured and assembled in America.
2. Manufacturer must have produced historic metal and iron fences and gates for a minimum of twenty years.

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with fence/gates by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION AND SCHEDULING

A. Coordinate installation of anchorages for fence/ gates. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following, or approved equal:

1. Stewart Iron Works Co.
   30 Kenton Lands Road, Suite B
   Erlanger, KY 41018-1874
   (800) 414-0753
   www.stewartironworks.com

2. Architectural Iron Designs, Inc.
   950 South 2nd Street
   Plainfield, NJ 07063
   (800) 784-7444

3. Lawler Foundry Corporation
   4908 Powell Avenue
   Birmingham, AL 35222
   (800) 624-9512

4. Wagner, R & B, Inc.
   P.O. Box 423
   Butler, WI 53007-0423
   (888) 243-6914

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.

1. Provide formed-steel brackets with predrilled hole for bolted anchorage and with snap-on cover that matches rail finish and conceals bracket base and bolt head.

2.3 STEEL AND IRON

A. Tubing: ASTM A 513 Type 1 (hot rolled).

B. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.

C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

D. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.4 ORNAMENTAL FENCE AND GATE MEDALLIONS

A. Medallions shall be Silicon Bronze, Herculoy regular grade, ASTM B 198-12A and UNS C87610 with the following properties:

1. 92% copper, 4% zinc, 4% silicon
2. All materials shall be certified ingot alloys meeting ingot number 500
3. Castings thickness: 1/2" minimum with 3/8" relief pattern as shown on Drawings.

B. Medallions shall be produced from sand castings, ASTM B 584-13.

2.5 FASTENERS

A. Fastener Materials: Unless otherwise indicated, provide the following:

1. Uncoated Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed; Type 304 stainless-steel fasteners where exposed.
2. Dissimilar Metals: Type 304 stainless-steel fasteners.

B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring fence/ gates to other types of construction indicated and capable of withstanding design loads.

C. Provide concealed fasteners for interconnecting fence/ gate components and for attaching fence/ gates to other work unless otherwise indicated.

D. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

E. Post-Installed Anchors: Torque-controlled expansion anchors.

2.6 GATE HARDWARE

A. Verify and coordinate all gate hardware to be compatible with gate configuration prior to installation.

B. Hinges: Signet/D&D Technologies Heavy Duty Self-Closing Barrel Hinges appropriate for weight of gate, or approved equal as submitted by gate manufacturer.. Three per gate.

1. Internal Stainless Steel Spring with Self-Lubricating Material
2. Polymer Casing with Stainless Steel Exterior Components
3. Color: Black

C. Electric Strikes: Locinox: Model SE.R, Electric strike with Fail Safe for exterior (wet) locations, or approved equal as submitted by gate manufacturer. One per gate.

1. Compatible for use with card reader, keypad control and gate release button entry
2. Voltage: 12V AC/DC
3. Current Ruptura (Fail Safe): 1.5 amp
4. Pressure resistance on self-latching bolt: 1,000 pounds

D. Manual Lockset: Locinox: Model LAKY F2, Ornamental Gate Lock, or approved equal as submitted by gate manufacturer. One per gate.

1. Key operated day bolt, key to lock position-both handles, for release only with key or electric strike.
2. Aluminum housing with stainless steel mechanism
3. Color: To match gate color
4. Handle: Both sides, ornamental level to match gate

2.7 CARD READERS, INTERCOMS, CALL BUTTONS AND OTHER DEVICES

A. Verify and coordinate all electronic items, gate hardware, and existing phone based intercom systems are compatible prior to installation.

B. Card Reader/Key Pad Control: Ingersoll Rand, Model: aptiQ MTK15 Multi-Technology Single-Gang Reader Keypad, for exterior (wet) locations, or approved equal. One per gate.

1. Location: As shown on Drawings and verified prior to installation
2. Color: Black

C. Intercom Box: Valcom: Model VIP-172L-ST SIP Intercom Doorphone for exterior (wet) locations, or approved equal. Coordinate with existing phone based intercom system.

1. Location: As shown on Drawings and verified prior to installation
2. Material: Stainless Steel
3. Equip with "Night Mode" Silencing

D. Doorbell Call Button and Gate Release Button: Stainless steel momentary push button switch with stainless steel cover plate and recessed boxes, for exterior (wet) locations.

1. Location: As shown on Drawings and verified prior to installation
2. Equip with "Night Mode" Silencing

2.8 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

C. Anchoring Cement: Factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.9 FABRICATION

A. General: Fabricate fence/ gates to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage.

B. Assemble fence/ gates in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Use connections that maintain structural value of joined pieces.

D. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

E. Form work true to line and level with accurate angles and surfaces.

F. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.

G. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

H. Connections: Fabricate fence/ gates with welded connections unless otherwise indicated.

I. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose.

J. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.

4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.

K. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

L. Close exposed ends of hollow fence/ gate members with prefabricated end fittings.

M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect fence/ gate members to other work unless otherwise indicated.

N. For fence/gate posts set in concrete, core drill concrete no larger than 1-inch larger than post diameter. Depth of core set to be 4-inches into structural concrete and does not include concrete wall caps. Epoxy all voids to full depth within core set.

2.10 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.11 STEEL AND IRON FINISHES

A. Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.

B. For non-galvanized steel fence/gates, provide non-galvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.

C. Preparing Non-galvanized Items for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with requirements indicated below:

1. Exterior Fence: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

D. Primer Application: Apply shop primer to prepared surfaces of fence/ gates unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Shop prime uncoated fence/ gates with universal shop primer as indicated by manufacturer.

E. For Hot Dipped Galvanized-steel fence/ gates, provide galvanized ferrous-metal fittings, brackets, fasteners, sleeves, and galvanized anchors to be embedded in exterior concrete or masonry.

F. Galvanizing: Hot-dipped galvanized products made from rolled, pressed, and forged steel shapes, castings, plates, bars, and strips indicated to be galvanized to comply with ASTMA 123/A 123M

1. Hot-dip galvanize steel and iron hardware indicated to comply with ASTM A 153/ A 153 M

G. Fill vent and drain holes that will be exposed in finished work, unless indicated to remain as weep holes, by plugging with zinc solder and filing smooth.

H. Preparation for Shop Priming

1. After galvanizing, feather sandblast product to lightly etch zinc surface for maximum paint adhesion:

a. Commercial Blast Cleaning – exteriors (SSPC Zone 1B) SSPC-6.

I. Thoroughly clean ornamental metal of grease, dirt, oil, flux, and other foreign matter and treat with metallic phosphate pre-treatment, rinse and seal surfaces.

J. High-Performance Coating: Apply polyurethane topcoats to e-coat primered surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer and listed below.

1. Color: Black
2. Finish: 0.5 mils cathodic epoxy base coat of PPG Powercron 590-534 (e-coat primer) with 4-6 mils TCI 8200-9000 polyester urethane satin black powder top coat

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing fence/ gates. Set fence/ gates accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of fence/ gate components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 4 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Adjust fence/gates before anchoring to ensure matching alignment at abutting joints.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing fence/gates and for properly transferring loads to in-place construction.

3.2 FENCE/GATE CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting fence/ gate components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

B. Expansion Joints: Install expansion joints at locations required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.3 ANCHORING POSTS

A. Use steel posts core set anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with non-shrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete.

C. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

D. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material.

E. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

1. For steel fence/ gates, weld flanges to posts and bolt to metal-supporting surfaces.

3.4 ATTACHING FENCE/ GATES

A. Anchor fence/ gate ends to concrete and masonry with sleeves concealed within fence/ gate ends and anchored to wall construction with anchors and bolts.

B. Secure wall brackets and fence/ gate end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.

3.5 CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

3.6 PROTECTION

A. Protect finishes of fence/ gates from damage during construction period with temporary protective coverings approved by fence/ gate manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 323119

SECTION 334100

STORM SEWER PIPE

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. The WORK under this Section includes providing all labor, materials, tools and equipment necessary for furnishing and installing pipe culverts, storm drains and underdrains, in accordance with these Specifications and in reasonably close conformity with the lines and grades shown on the Drawings or as directed by the DEPARTMENT. The WORK also includes connecting to existing storm drain pipe.

B. This WORK also includes furnishing and installing connecting bands, branch connections, elbows and end sections required to complete the culvert or drain structure.

C. This WORK also includes installing and connecting foundation drains, roof drains and other drains to storm drain structures, including all fittings and elbows to make a satisfactory installation.

1.03 SUBMITTALS

A. Storm Sewer Pipe: Material certifications stating conformance with requirements of this section and manufacturer's catalog cuts of pipe materials and fittings.

PART 2 – PRODUCTS

2.01 PVC PIPE CONDUIT

A. PVC Pipe Conduit shall have a standard dimension ration (SDR) of 35 and conform to ASTM D 3034. Before any PVC pipe is used on this Project, the CONTRACTOR shall supply certifications, signed by an authorized agent of the seller or manufacturer, stating that the material has been sampled, tested, and inspected in accordance with ASTM D 3034.

B. The pipe shall have integral wall bell and spigot joints conforming to ASTM D 3212. The bell shall consist of an integral wall section with a solid cross section elastomeric ring, factory assembled, securely locked in place to prevent displacement.

C. Flexible watertight connections, approved by the DEPARTMENT, shall be used at PVC pipe connections to manholes and other rigid structures.

2.02 CORRUGATED POLYETHYLENE PIPE

A. Corrugated polyethylene pipe (CPP) shall be high density corrugated polyethylene, smooth interior pipe, and shall be manufactured in conformity with the latest AASHTO M 294, Type S specification, and shall meet the requirements of ASTM D 3350 Cell Classification 324420C, or ASTM D 1248, Class C, Category 4, Grade P33.

B. Pipe shall be joined with "Hancor, Inc. Hi-Q Sure-Lok" (bell-and-spigot) joint, or approved equal, meeting the requirements of AASHTO M 294. The bell shall be an integral part of the pipe and provide a minimum pull-apart strength of 400 pounds.

C. The bell-and-spigot joint shall incorporate a gasket making it silt-tight. Gaskets shall be installed in the bell, or on the pipe, by the pipe manufacturer.

D. Fittings shall conform to AASHTO M 294. Fabricated fittings shall be welded on the interior and exterior at all junctions. All fittings shall connect to the pipe with a bell and spigot joint.

E. All cut corrugations on CPP pipe shall be cleared of all water and completely grouted to prevent the accumulation of water.

2.03 HDPE PRESSURE PIPE

A. HDPE pressure pipe shall conform to requirements of HDPE pressure pipe within section 334103 – HDPE Pipe and Fittings.

2.04 FOUNDATION AND WALL DRAINS

A. Foundation and wall drains shall be perforated PVC pipe conforming to Article 2.1 of this Section, with two rows of slots or perforations set at 60º from the invert position.

2.05 UNDERGROUND MARKING TAPE

A. Underground Marking Tape shall be yellow, at least 4-inches wide, 4-mil thick, polyethylene tape with a metallic backing capable of being traced with locators. The tape shall have black letters with the following wording: "Caution: Storm Sewer Line Buried Below", or similar. The marking tape shall be installed 12-inches above the top of all storm sewer mains and services.

PART 3 – EXECUTION

3.01 CONSTRUCTION

A. Excavation, Bedding, and Backfill shall conform to the requirements of Section 312002 – Trenching. All pipe shall have a minimum cover of 12 inches, unless otherwise shown on the Drawings or directed by the DEPARTMENT.

B. The pipe laying shall begin at the downstream end of the pipe. The lower segment of the pipe shall be in contact with the shaped bedding throughout its full length. Bell or groove

ends of rigid pipe and outside circumferential laps of flexible pipe shall be placed facing upstream.

C. Joints shall be made with rubber gaskets.

D. Flexible conduits shall be firmly joined by approved coupling bands.

E. Conduit shall be inspected before any backfill is placed. Any pipe found to be substantially out of alignment, unduly settled, or damaged shall be taken up and relaid or replaced.

F. Installation of all pipes shall conform to the manufacturer's recommended procedures. These Specifications and the Drawings shall take precedence over the manufacturer’s recommendations in the event of conflict, if more restrictive.

G. Pipe culvert shall be installed as shown on the Drawings, unless otherwise directed by the DEPARTMENT. All bends, couplings and other fittings necessary to connect to existing pipes or flows shall be approved by the DEPARTMENT.

H. All cut corrugations on CPP pipe shall be cleared of all water and completely grouted to prevent the accumulation of water.

END OF SECTION