Exhibit A – Scope of Work and Specification

SHULL ELEMENTARY SCHOOL

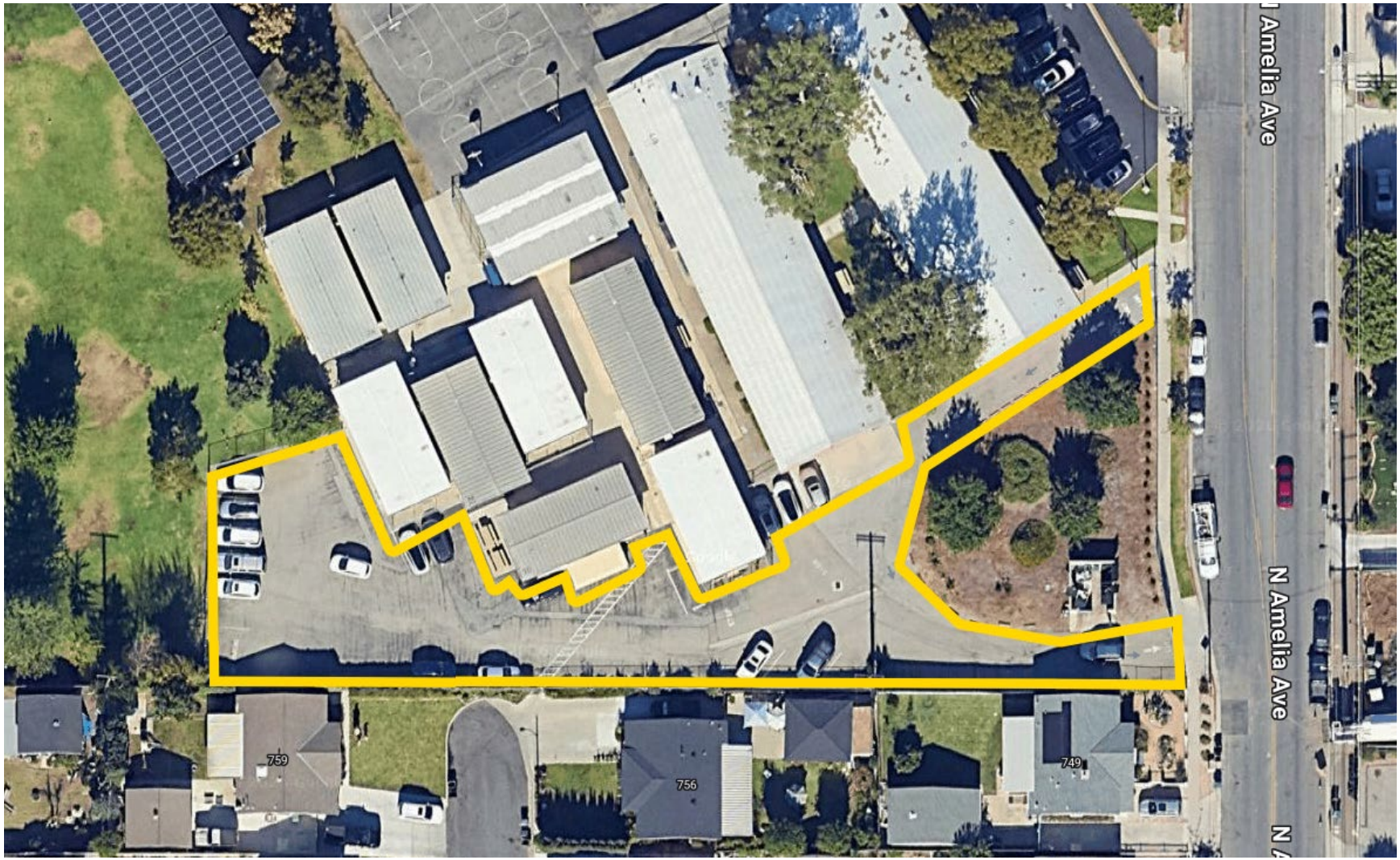

Exhibit A – Scope of Work and Specification

SAN DIMAS HIGH SCHOOL

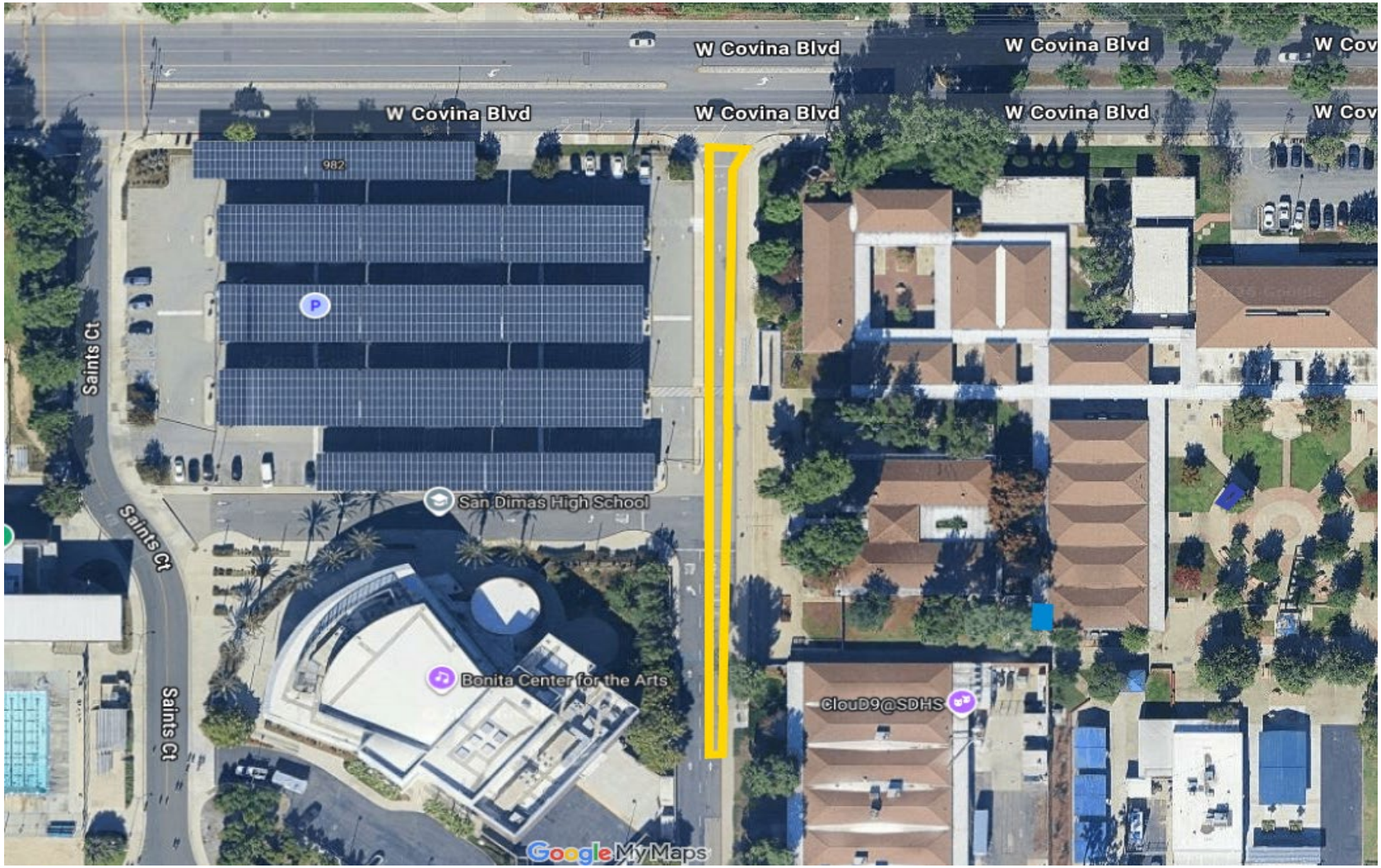

Exhibit A – Scope of Work and Specification

DISTRICT OFFICE (FRONT PARKING LOT)

APPLICABLE CODES

PARTIAL LIST OF APPLICABLE CODES AS OF January 1, 2020*

2019 California Administrative Code (CAC), Part 1, Title 24 CCR*
2019 California Building Code (CBC), Part 2, Title 24 CCR
(2018 International Building Code, Vol. 1 & 2, and 2019 California amendments)
2019 California Electrical Code (CEC), Part 3, Title 24 CCR
(2017 National Electrical Code and 2019 California Amendments)
2019 California Mechanical Code (CMC), Part 4, Title 24 CCR
(2018 IAPMO Uniform Mechanical Code and 2019 California amendments)
2019 California Plumbing Code (CPC), Part 5, Title 24 CCR
(2018 IAPMO Uniform Plumbing Code and 2019 California amendments)
2019 California Energy Code (CEC), Part 6, Title 24 CCR
2019 California Fire Code (CFC), Part 9, Title 24 CCR
(2018 International Fire Code and 2019 California Amendments)
2019 California Existing Building Code (CEBC), Part 10, Title 24 CCR
(2018 International Existing Building Code and 2019 California Amendments)
2019 California Green Building Standards Code (CALGreen), Part 11, Title 24 CCR
2019 California Referenced Standards Code, Part 12, Title 24 CCR
Title 19 CCR, Public Safety, State Fire Marshal Regulations
2016 ASME A17.1/CSA B44-13 Safety Code for Elevators and Escalators (per 2019 CBC Part 2 CH 35)
Note: Cal/OSHA Elevator Unit enforces CCR Title 8 and uses the 2004 ASME A17.1 b adoption

PARTIAL LIST OF APPLICABLE STANDARDS

NFPA 13 - Standard for the Installation of Sprinkler Systems (CA amended).....2016 Edition
NFPA 14 - Standard for the Installation of Standpipe and Hose Systems (CA Amended).....2016 Edition
NFPA 17 - Standard for Dry Chemical Extinguishing Systems.....2017 Edition
NFPA 17A - Standard for Wet Chemical Extinguishing Systems.....2017 Edition
NFPA 20 - Standard for the Installation of Stationary Pumps for Fire Protection.....2016 Edition
NFPA 22 - Standard for Water Tanks for Private Fire Protection.....2013 Edition
NFPA 24 - Standard for the Installation of Private Fire Service Mains and their Appurtenances (CA amended).....2016 Edition
NFPA 72 - National Fire Alarm and Signaling Code (CA amended).....2016 Edition
NFPA 80 - Standard for Fire Doors and Other Opening Protectives.....2016 Edition
NFPA 2001 - Standard on Clean Agent Fire Extinguishing Systems (CA amended).....2015 Edition
UL 300 - Standard for Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment.....2005 (R2010)
UL 464 - Audible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories.....2003 Edition
UL 521 - Standard for Heat Detectors for Fire Protective Signaling Systems.....1999 Edition
UL 1971 - Standard for Signaling Devices for the Hearing Impaired.....2002 (R2010)
ICC 300 - Standard for Bleachers, Folding and Telescopic Seating, and Grandstands.....2017 Edition

For a complete list of applicable NFPA standards refer to 2019 CBC (SFM) Chapter 35 and California Fire Code Chapter 80.

See California Building Code Chapter 35 for State of California amendments to the NFPA Standards.

*All parts of the 2019 California Building Code become effective January 1, 2020 except the effective date for the use of the 2019 Building Energy Efficiency Standards (Title 24, Part 1, Chapter 10) is January 8, 2019 and the effective date for the use of the California Administrative Code (Title 24, Part 1,Chapter 4) is January 8, 2019.

SECTION 32 12 16.08
ASPHALTIC CONCRETE PAVING, PATCHING, OVERLAY AND REPLACEMENT

PART 1 - GENERAL

1.01 SUMMARY OF WORK

A. Asphaltic concrete paving.

B. Patching existing pavement.

C. Overlay existing pavement (where specified)

D. Fill all cracks in existing paving.

E. Surface sealer coats.

F. Path to pedestrian areas shall comply with 11B - 302-1 and 11B - 303.

G. All paving along the Accessible Path of Travel to be slip-resistant finish.

1.02 RELATED WORK

A. Subsurface exploration all recommendation stated in the Geotechnical report supersedes requirements in this section.

B. Section 32 12 36.13 - Asphalt Pavement Seal Coat.

C. Section 32 17 23. - Pavement Marking.

1.03 REFERENCES

A. California Department of Transportation (CALTRANS), Division of Highways Standard Specifications, as last amended.

B. Definitions: Paving and base Type designations.
   1. Type A: Areas taking automobile traffic.
   2. Type B: Areas taking bus and/or truck traffic and fire lanes.
   3. Type C: Areas taking pedestrian traffic (hard-court/play areas).
   4. Type E: Areas where paving is to be replaced. Refer to 3.06.

1.04 QUALITY ASSURANCE

A. Perform work in accordance with CALTRANS Standard Specifications.

B. Off-site work to conform to local governing agency requirements. Obtain andpay for required permits and licenses. Do required testing.

C. Allowable Tolerances:
   1. Material Weights: Weights of base course and paving materials delivered to Site shall be computed as follows:
      a. Asphalt Concrete Paving: 12 lbs/sf/inch of thickness.
      b. Rock Base Course: 9-1/2 lbs/sf/inch of thickness.
   2. Paving Surface Smoothness: 3/8" maximum permissible from a true plane measured from 10' straight edge placed on surface non-cumulative.
   3. When the end use of this Asphalt paving is for playground use, Contractor shall insure achievement of a smoothness, which will permit child play without injury due to roughness of surface. Contractor will use aggregate smaller than ½" diameter to achieve desired smooth surface on playground areas.

4. Contractor will be responsible for establishing all necessary grades and elevations for his construction purposes to insure a uniform surface, proper drainage, and reasonable alignment with existing structures, utilities hardware, and landscaping, subject to District approval. Contractor shall be responsible for all underground utilities (gas, water, telephone, sprinkler systems, intercom, security, fire alarm, etc.).

1.05 SUBMITTALS

A. Submit product data.

B. Submit test reports of field quality control tests.

C. Submit Weighmaster's Certificates showing net weight of each load of base and paving materials.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Place asphalt when base surface temperature is above 40°F and dry, and when weather is stable.

B. Do not commence work until installation of underground pipes and utilities is complete.

1.07 GUARANTEE

A. In addition to guarantee specified in Contract Close-Out, Section 01700, the Contractor shall repair or restore to first class condition any portion of asphaltic paving and surface coating in which weed growth, creeping, shoving, cracking, delamination, raveling, softening, excessive or uneven settlement due to improperly compacted subgrade, or other defects due to improper placing or defective materials, become apparent within one (1) year from acceptance date by the District.

B. Effectiveness of type of weed control is sole responsibility of the Contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Weed Control:

1. Herbicide: Only use of borates, less than 30% sodium chlorate, or other nonpoisonouschemicals will be permitted.
2. Option: The Contractor may, at his option and expense, use Nox-Weed 310 emulsion.
3. Nonflammable, not creating a fire hazard applied in accordance with the manufacturer's recommendation soluble in water, and capable of being spread dry or in solution.
4. Acceptable products are Chlorax 40, Monobar-Chlorate, or equal.

B. Base Course: Untreated rock using a pit run unwashed stream bar material, crusher run material, or blend of commercial products; graded as follows:
   1. Class 2 Aggregate Base, per Section 26, CALTRANS Standard Specifications.
   2. Subbase aggregate maximum size: 1-1/2".
   3. Base aggregate maximum size:
      - Base courses over 6" thick: 1-1/2"
      - Other base courses: ¾"
   4. Mixing: Thoroughly blend material by blading or other suitable means.

C. Asphalt Concrete Paving:
   1. General: CALTRANS Standard Specifications, except as modified herein.
   2. Asphalt: 50/60 penetration.
   3. Prime Coat: Cut back grade type, grade MC-250
   4. Tack Coat: Uniformly emulsified, grade SS1H
   5. Aggregate: Graded mix as follows:

TOTAL PERCENTAGE PASSING SIEVES

Sieve Size	Percentage
3/4"	100%
1/2"	90%-100%
3/8"	74%-89%
No. 4	53%-67%
No. 8	40%-50%
No. 30	20%-30%
No. 200	3%-8%
Paving Asphalt	5-1/2 % to 7% by weight of total mix

   6. Mixing: Plant mix aggregate and asphalt, to produce a dense mixture with minimum of voids, per Section 39, CALTRANS Standard Specifications.
   7. Asphalt concrete

D. Petromat reinforcing fabric, Petromat or equal, is to be placed and applied with AR4000 oil at the rate of .25 per square yard.

E. Surface Seal Coat for All Paving Areas:
   1. Refer to Specification 32 12 36.13 Asphalt Pavement Seal Coat.
   2. Meet Green Book, Specification No. 203-9-Seal Coat Asphalt Base.
   3. Sealer shall be Multex, Over Kote Asphalt Pavement Coating by Reed & Graham,Inc. or approved equal.

F. Asphalt crack filler AR 4000 Sheetmix 100 may be used.

G. New headers made of 2" x 4" redwood shall be placed at all edges of pavement marked on Drawings.
   1. Headers shall be set with top to finished grade and staked in place with 2" x 4" Redwood stakes, 14" long and spaced 3 feet apart. Header joints shall be secured with 24" splices.
   2. Headers surrounding irregularly shaped Asphalt paved areas shall be neatly shaped to appropriate contours as approved by the District.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify compacted subgrade is dry and ready to support paving and imposedloads.

B. Verify gradients and elevations of base are correct.

C. Beginning of installation means acceptance of substrate.

3.02 PREPARATION

A. Subgrade Preparation: After areas are brought to approximate required subgrade, finish by scarifying to depth of 3", moistening and rolling with a self- propelled tandem roller, weighting 8 tons minimum, until surface is firm and unyielding. Bring any depressions and high areas to required grade by scarifying, filling or cutting, and rolling to density and stability of adjoining material.

B. Weed Control: Just prior to paving work, apply herbicide to earth as per manufacturer's printed recommendations.

C. New Headers per Section 2.01E.

D. Coat surfaces of manhole catch basin metal surface frames with oil to preventbond with asphalt paving.

E. All manhole covers, monuments, etc. are to be raised level with new surface height of new asphalt.

F. Drainage must be maintained while doing all asphalt work.

G. When filling cracks larger than ¼", use asphalt or appropriate backer rod, i. e. ¼", ½", ¾", 1", etc. as necessary prior to using crack sealer. Backer rod must be ¼" larger than crack that is to be sealed. Asphalt crack filler AR 4000 Sheetmix 100 may be used.

3.03 INSTALLATION - BASE COURSE

A. Spread to uniform thickness; water and roll until firm enough to support materialtrucks without displacement or rutting.

B. Compacted Thicknesses:
   1. Type A Areas: 7.5".
   2. Type B Areas: 12".
   3. Type C Areas: 6".

4. Type E Areas: 6" minimum. Refer to Paragraph 3.06.

C. Density Required: 90% minimum.

3.04 INSTALLATION - PAVEMENT WEARING COURSE

A. General: Conform to Section 39, CALTRANS Standard Specifications.

B. Placing: Spread to headers and/or temporary screeds, where required, with Barber-Greene self-propelled mechanical spreading and finishing equipment, or Architect-approved equal. Hand spread only in places inaccessible to mechanical spreader. Heat shovels, forks and rakes.

C. Edges: At headers, lay to a thickness 4" deep x 8" wide at bottom, forming a footing. Slope bottom up 3:1 to meet typical paving thickness. Where paving stops against buildings, walls, curbs, or concrete walks, thickened edges are not required.

D. Abutting Work: Where paving contacts rigid structures, thoroughly clean and coat contact surfaces with a film of asphalt emulsion and/or asphalt cement. Protect adjoining work from spotting and splashing or asphalt materials.

E. Rolling and Smoothness: Roll per Section 39, CALTRANS Standard Specifications. Finished surface to be even, smooth, of uniform texture free of roller welts, true to place and line, and drain as indicated. Paving to have a density such that water will not penetrate.

F. Compacted Paving Thicknesses:
1. Type A Areas: 3".
2. Type B Areas: 4".
3. Type C Areas: 3".
4. Type E Areas: 3" minimum.

3.05 APPLICATION – PAVEMENT REINFORCING FABRIC

A. Fabric shall be placed by a machine equipped to unroll and smooth the fabric. Adjacent boarders of the fabric shall be lapped six (6) inches. The preceding roll shall overlap the following roll at transverse overlaps in the direction of the initial rolling. The fabric shall be placed as smoothly as possible. Wrinkles that are large enough to cause laps shall be cut and nailed to the pavement. Nails shall be commercial quality, broadhead roofing nails.

B. Turning of the paving machine and other vehicles shall be gradual and kept a minimum to avoid damage.

C. On curved alignments, reinforcing fabric shall be cut so that cords over the cracked pavement areas plus on foot on all sides.

D. Traffic shall not be allowed on the bare reinforcing fabric, except that public cross traffic shall be allowed to cross the fabric, under control of the Contractor, and after the Contractor has placed a small quantity of asphalt concrete over the fabric.

3.06 APPLICATION - SURFACE SEAL

A. Refer to Specification Section 32 12 36.13, Asphalt Pavement Seal Coat/CrackFiller.

B. Preparation:
   1. Clean paving surface removing all loose, foreign materials.
   2. Contractor shall exercise one of the following procedures:
      a. Remove existing concrete parking bumpers prior to seal coat application and replace all bumpers on the original manner after curing period.
      b. Mask all bumpers completely to prevent seal coat from splashing onto bumpers.
   3. Preventive measures shall be taken to protect existing concrete surfaces including curbs, walks, light pole mounting piers, etc., from over-splash byseal coat.

C. Application:
   1. Per manufacturer's recommendations.
   2. Mix into a slurry with three to six lbs. of sand per gallon of sealer.
   3. Protect adjacent structures from mixture.
   4. **Apply evenly in two coats.** Spread immediately with rubber-faced squeegees; pull at angle from line of spread, to roll material toward operator. After each coat has dried, remove ridges with scraper.
   5. Total Application Rate for Two Coats: Apply at an undiluted rate of 0.2 gallons minimum per square yard. Increase application rate due to surface porosity per manufacturer's printed recommendations.
   6. Achieve a finished surface seal which, when dry and thoroughly set, is smooth, tough, resilient of uniform black color, and free from coarse textured areas, lap marks, ridges and other surface irregularities.

D. Protect from traffic for three (3) days minimum after application.

3.07 TYPE E ASPHALT - PAVING REPLACEMENT

A. Examine area and correct conditions detrimental to timely and proper completion of work. DO NOT PROCEED until satisfactory conditions are corrected.

B. Any damaged or unacceptable Asphalt Concrete pavement area to be replaced will specifically identified by District.

C. The Contractor will excavate and remove completely the old Asphalt Concrete pavement, base, material, and sub-base material as necessary to accommodate the required replacement construction.

D. If the base or sub-base material damage or failure is more extensive (deeper) than the removal required for the replacement construction, then excavation will be accomplished to an extent necessary for removal of all undesirable base or sub-base material as determined by the District.

E. The acceptable base or sub-base material will be cleaned and compacted.

F. Sufficient new and clean base material will be applied and compacted to prepare adequately for installation of the required compacted base material and asphalt surface as appropriate.

G. The areas where excavation occurs shall be regraded.

H. Establish subgrade elevations allowing for new asphalt layers.

I. Rip established subgrade surface to depth to per Geotechnical Report and bring to optimum moisture content and compact to 95% minimum.

J. Prepare and sterilize new surface per CALTRANS Standards.

K. Apply the weed killer to the entire area to be paved.

L. Do not accept material unless it is covered with a tarpaulin until unloaded and unless the material has a temperature of not less than 280 degrees F.

M. Do not commence placement of asphaltic concrete materials when the atmospheric temperature is below 50 degrees F., nor during fog, rain or other unsuitable conditions.

N. After the material has been spread to the proper depth, roll until the surface is hard, smooth, unyielding and true to grade. Roll in at least two directions until no further roller marks are visible. Rolling shall be by means of an approved 8 ton power roller. Finish paving is to be free from birdbaths, surface shall show no greater variation than 1/8 inch when checked with a 6 foot straight edge, except where breaks in the grade are required.

O. Asphalt is to be tapered (except where required to be raised) to existing manholes, monuments, etc. on walkways and present a neat appearance.

P. Place two lifts of hot asphalt for a finished thickness of 3" at hardcourt, 3" at parking lot and 4" at Bus and fire lane. Top lift to be 3/8" fine asphalt paving 1- 1/2" thick, lower lift 1/2" maximum, medium asphalt paving 2-1/2" thick. Place,compact, and test per current Caltrans Standards.

Q. Apply (2) application of seal coat over all paving.

3.08 FIELD QUALITY CONTROL

A. On-Site Work:

1. Water Test: Flood test paving to show surfaces are free of standing puddles and drain properly.

2. Material Tests:
   a. Made at District's option, by District selected Testing Lab.
   b. District's Inspector to select test sample locations.
   c. The Contractor is to repair test areas at no additional cost to District.
   d. Testing costs by Contractor.

3.09 CLEANING

Remove equipment, excess materials, debris, and material splashes from abuttingwork.

3.10 REPAIR EXISTING CRACKS:

A. Less than ¼": Fill with Over Kote 1, Crack Filler by Reed & Graham, Inc. or approved equal.

B. Greater than ¼" but less than ½": Fill with Over Kote, Crack Filler 2 by Reed & Graham, Inc. or approved equal.

C. Greater than 1/2" but less than 1": Remove asphalt a minimum of 2" down or to sound pavement and re-pack area with asphalt paving mix following procedures under paragraph 3.06.

D. Greater than 1": Follow procedures under paragraph 3.06.

3.10 PATCHING EXISTING PAVEMENT

A. Remove any defective pavement and existing deteriorated in areas defined and all pavement disturbed by construction activity to minimum 6" in depth or until sound subgrade is obtained. Extend limits minimum 1' into sound pavement; make cuts in straight lines.

B. Contractor to remove spoils from site and dispose of properly.

C. Apply tack coat to sides and bottom of excavated areas.

D. Place asphaltic concrete in maximum 4" high lifts thoroughly and evenly compact using equipment which will obtain maximum compaction without damage to surrounding pavement.

E. Contour and blend patches to lines and elevations of adjacent surfaces.

F. Determine location of "bird baths". Apply tack coat and blend new leveling asphalt to existing surface.

G. Repairing Existing Cracks:
   1. Less than 1/4": fill with Over Kote 1, Crack Filler by Reed & Graham, Inc. or approved equal.
   2. Greater than 1/4" but less than 1/2": fill with Over Kote, Crack Filler 2 by Reed & Graham, Inc. or approved equal.
   3. Greater than 1/2" but less than 1": Remove asphalt a minimum of 2" down or to sound pavement and re-pack area with asphalt paving mix following procedures under Paragraph 3.06.
   4. Greater than 1": Follow procedure under Paragraph 3.06.

H. Apply 2 applications of seal coat 2 days apart over entire surface and re-stripe.

3.11 OVERLAY EXISTING WALKWAYS, TENNIS OR BASKETBALL COURTS PAVEMENT (where specified)

A. Remove defective pavement, heavy pavement, and existing deteriorated in areas defined to receive overlay and all pavement disturbed by construction activity to minimum 6" in depth or until sound subgrade is obtained. Extend limits minimum 12" into sound pavement; make cuts in straight lines.

B. Basketball Courts: Remove all existing asphalt paving 6'-0" around the perimeter of the area to allow flush transition between new paving and existing surface. New asphaltic concrete paving to be a minimum depth of 4".

C. Contractor to remove from site and dispose of properly.

D. Determine location of "bird baths". Apply tack coat and blend new leveling asphalt to existing surface.

E. Repairing Existing Cracks:
   1. Less than 1/4": Fill with Over Kote 1, Crack Filler by Reed & Graham, Inc. or approved equal.
   2. Greater than 1/4" but less than 1/2": Fill with Over Kote, Crack Filler 2 by Reed & Graham, Inc. or approved equal.
   3. Greater than 1/2" but less than 1": Remove asphalt a minimum of 2" down or to sound pavement and re-pack area with asphalt paving mix following procedure under Paragraph 3.06.
   4. Greater than 1": Follow procedure under Paragraph 3.06.

F. Apply tack coat to entire area to receive overlay.

G. Install continuous Geotextile Interlayer for Bituminous Pavement Overlay over entire area to receive overlay.

H. Place 2" Dense Grade Hot Mix asphaltic concrete with aggregate not to exceed 3/8" thoroughly and evenly compact using equipment which will obtain maximum compaction without damage to surrounding pavement.

I. Liquid Asphalt or Bitumen: Not less than 5.5% by weight.

J. Asphalt penetration or type: 85-100 Penetration.

K. Roll overlay asphaltic concrete per Caltran guidelines.

L. Apply 2 applications of seal coat two days apart over entire surface and re-stripe.

END OF SECTION

SECTION 32 12 36.13
ASPHALT PAVEMENT SEAL COAT AND CRACK FILLER

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. All new and existing asphalt pavement areas as indicated in the Drawings isto be seal coated.

B. All existing asphalt pavement areas to receive seal coat as indicated in theDrawings is to have all cracks filled prior to seal coats.

1.02 RELATED SECTION

A. Section 32 12 16.08 - Asphaltic Concrete Paving, Patching andReplacement.

B. Section 32 17 23 - Pavement Marking.

1.03 QUALITY ASSURANCE

A. Qualification of workmen:

1. Provide at least one person who shall be thoroughly trained and experienced in the skills required, who shall be completely familiar with the design and application of work described for this section, and who shall be present at all times during progress of the work of this section and shall direct all work performed under this section.
2. For actual seal coating and operation of the required equipment, use only personnel who are thoroughly trained and experienced in the skills required.

PART 2 - PRODUCTS

2.01 SEAL COAT

A. The surface Seal Coat of existing and new Asphalt Pavement shall meetGreen Book, Specification No. 203-9 Seal Coat Asphalt Based.

B. Over Kote Asphalt Pavement Coating, Over Kote 1 Crack Filler and Over KoteCrock Filler 2 by Reed & Graham, Inc. or approved equal.

2.02 CRACK FILLER

A. Over Kote Asphalt Pavement Coating, Over Kote Crack Filler and Over KoteCrock Filler II by Reed & Graham, Inc. or approved equal.

2.03 OTHER MATERIALS

All other materials, not specifically described but required for proper and complete installation of pavement seal coat, shall be provided to complete the work of this section.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

A. Inspection: Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point wherethis installation may properly commence.

1. Verify that seal coat may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

B. Discrepancies:
   1. In the event of discrepancy, immediately notify the Architect.
   2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

C. New and existing Asphalt Paving:
   1. The surface shall be cleaned of all dirt, debris oil, or foreign matter. After thoroughly cleaning, dampen the surface with water. Remove any excess water prior to application of sealer. Rough or irregular areas are to be treated with a mastic mix consisting of two pounds of 30 mesh silica sand per gallon of seal coat, prior to the applications of seal coats.

D. Repairing Existing Cracks:
   1. Less than 1/4" fill with Over Kote 1, Crack Filler by Reed & Graham, Inc. or approved equal.
   2. Greater than 1/4" but less than 1/2" fill with Over Kote, Crack Filler 2 by Reed & Graham, Inc. or approved equal.
   3. Greater than 1/2" but less than 1". Remove asphalt a minimum of 2" down or to sound pavement and re-pack area with asphalt paving mix following procedures under Section 32 12 16.08, Paragraph 3.06.
   4. Greater than 1". Follow procedure under Section 32 12 16.08, Paragraph 3.06.

E. New Asphalt Paving is not to be seal coated for a minimum of 36 days after installation of asphalt, to allow new paving to cure and prevent slurry seal blistering.

3.02 APPLICATION

A. Seal coat shall be a two-coat application, each at the rate of approximately 25 gallons per 1000 square feet of pavement for application of each coat at 3 mils minimum thickness. Application may be made with squeegees, brooms, or mechanical applicators designed for applying slurry seal. Application is to be made by experienced technicians. Finished surface shall be smooth, without ridges, loops, and holidays.

B. Apply per manufacturer recommended procedure.

C. Do not place seal coat when the atmospheric temperature is below 65°F, or during unsuitable weather.

D. Provide **two (2)** applications of seal coats on both new and existing asphalt surface as indicated on the Drawings. Coats shall be a minimum two (2) daysapart.

E. At new asphalt paving the Contractor shall be required to stripe parking lot areas where parking lot work is indicated, immediately after placement of asphalt. Contractor shall re-stripe a second time, 45 days later after application of seal coats.

3.03 CLEANING AND PROTECTION

A. After completion of operations, clean surfaces of excess or spilled slurry material.

B. Do not allow any foot or vehicular traffic on paving for 24 hours minimum, or until paving slurry has dried.

C. Provide proper barricades and warning devices for slurry seal protection untilit is opened to traffic.

END OF SECTION

SECTION 32 17 23
PAVEMENT MARKINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Traffic lines and markings.
   2. Legends.
   3. Paint.
   4. Glass beads.

B. Related Sections:
   1. Section 32 12 16.08 - Asphalt Concrete Paving, Patching, and Replacement

C. Provisions of Division 1 to apply to this section.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Traffic Lines and Markings:
   1. Basis of Measurement: By linear foot.
   2. Basis of Payment: Includes furnishing, installing, inspecting, and maintaining pavement markings for minimum of three (3) years, and related maintenance and protection of traffic.

B. Legends:
   1. Basis of Measurement: By square foot.
   2. Basis of Payment: Includes furnishing, installing, inspecting, and maintaining pavement markings for minimum of three (3) years, and related maintenance and protection of traffic.

1.3 REFERENCES

A. American Association of State Highway and Transportation Officials:
   1. AASHTO M247 - Standard Specification for Glass Beads Used in Traffic Paint.

B. ASTM International:
   1. ASTM D34 - Standard Guide for Chemical Analysis of White Pigments.
   2. ASTM D126 - Standard Test Methods for Analysis of Yellow, Orange, and Green Pigments Containing Lead Chromate and Chromium Oxide Green.
   3. ASTM D562 - Standard Test Method for Consistency of Paints Using the Stormer Viscometer.
   4. ASTM D711 - Standard Test Method for No-Pick-Up Time of TrafficPaint.
   5. ASTM D713 - Standard Practice for Conducting Road Service Tests on Fluid Traffic Marking Materials.
   6. ASTM D969 - Standard Test Method for Laboratory Determination of Degree of Bleeding of Traffic Paint.
   7. ASTM D1301 - Standard Test Methods for Chemical Analysis of White Lead Pigments.
   8. ASTM D1394 - Standard Test Methods for Chemical Analysis of White Titanium Pigments.

9. ASTM D1475 - Standard test Method for Density of Liquid Coatings, Inks, and Related Products.
10. ASTM D1640 - Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature.
11. ASTM D2202 - Standard Test Method for Slump of Sealants.
12. ASTM D2371 - Standard Test Method for Pigment Content of Solvent-Reducible Paints.
13. ASTM D2621 - Standard Test Method for Infrared Identification of Vehicle Solids From Solvent-Reducible Paints.
14. ASTM D2743 - Standard Practices for Uniformity of Traffic Paint Vehicle Solids by Spectroscopy and Gas Chromatography.

C. California Manual on Uniform Traffic Control Devices (CMUTCD).

D. Standard Specifications for Public Works Construction (SSPWC).

E. California Building Code, 2019 Edition.

1.4 PERFORMANCE REQUIREMENTS

A. Paint Adhesion: Adhere to road surface forming smooth continuous film one minute after application.

B. Paint Drying: Tack free by touch so as not to require coning or other traffic control devices to prevent transfer by vehicle tires within two minutes after application.

1.5 SUBMITTALS

A. Product Data: Submit paint formulation for each type of paint.

B. Samples:
   1. Submit eight (8) sample plates of each color of material. Prepare four (4) plates without glass beads and four (4) with glass beads for each different batch of material. After approval, Owner will retain these plates for field comparisons of applied paint.
   2. Submit two gallons and four one quart paint samples accompanied by properly executed test reports.
   3. Submit samples of glass bead in compliance with AASHTO M247.

C. Test Reports: Submit source and acceptance test results in accordance with AASHTO M247.

D. Manufacturer's Installation Instructions: Submit instructions for application temperatures, eradication requirements, application rate, line thickness, type of glass beads, bead embedment and bead application rate, and any other data on proper installation.

E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

F. Contractor is to provide District with sketches of pavement markings for District approval prior to installation.

1.6 QUALITY ASSURANCE

A. Sustainable Design Requirements:
   1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

B. Perform Work in accordance with SSPWC, CBC-2019 and the MUTCD.

C. Maintain one (1) copy each document on site.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three (3) years documented experience.

B. Applicator: Company specializing in performing work of this section with minimum three (3) years documented experience and approved by Architect/Engineer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Invert containers several days prior to use when paint has been stored more than 2 months. Minimize exposure to air when transferring paint. Seal drums and tanks when not in use.

B. Glass Beads. Store glass beads in cool, dry place. Protect from contamination by foreign substances.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.

B. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.

C. Do not apply paint when temperatures are expected to fall below 50 degrees F for 24 hours after application.

D. Volatile Organic Content (VOC). Do not exceed State or Environmental Protection Agency maximum VOC on traffic paint.

1.10 WARRANTY

A. Furnish three (3) year manufacturer's warranty for traffic paints.

1.11 MAINTENANCE SERVICE

A. Furnish service and maintenance of traffic paints for three years from Date of Substantial Completion.

PART 2 PRODUCTS

2.1 PAINTED PAVEMENT MARKINGS

A. Manufacturers:
   1. Pervo Paint Company.
   2. Pathmark Traffic Products.
   3. Safety Coatings Inc.
   4. Franklin Paint Company.
   5. EZ-Liner Industries Model.
   6. Substitutions: Permitted with prior approval of Architect/Engineer.

B. Furnish materials in accordance with SSPWC and the CMUTCD.

C. Paint: Ready mixed, conventional and fast dry waterborne traffic paints, lead-free, non-toxic, NASSHTO Test Deck, minimum retroreflectance of 100 mcds, durability rating of 6 or more after in place for 9 months; within following limits:
   1. Pigment, percent by weight: 60 plus or minus 2.
   2. Vehicle, percent by weight: 40 plus or minus 2.
   3. Non-Volatile, percent by weight of paint: 76.0.
   4. Weight per gallon, pounds minimum 13.0.
   5. Viscosity: 80-95 Kreb Units at 77 degrees F.
   6. Grind (Hegeman Guage), minimum Field Tested no tracking time under ambient conditions: 20-90 seconds.
   7. Dry Through Time, 15 mils wet at 90 percent relative humidity, 72 degrees F, ASTM D1640: 125 minutes maximum.
   8. VOC (Volatile Organic Content): One lbs/gal maximum.

D. Glass Beads: AASHTO M247, Type 1, coated to enhance embedment and adherence with paint.

2.2 EQUIPMENT

A. Continuous Longitudinal Line Application Machine: Use application equipment with following capabilities.
   1. Dual nozzle paint gun to simultaneously apply parallel lines of indicated width in solid or broken patterns or various combinations of those patterns.
   2. Pressurized bead-gun to automatically dispense glass beads onto painted surface, at required application rate.
   3. Measuring device to automatically and continuously measure length of each line placed, to nearest foot.
   4. Device to heat paint to approved temperature for fast dry applications.

B. Machine Calibration:
   1. Paint Line Measuring Device: Calibrate automatic line length gauges to maintain tolerance of plus or minus 25 feet per mile.
   2. Cycle Length/Paint Line Length Timer: Calibrate cycle length to maintain tolerance of plus or minus 6 inches per 40 feet; calibrate paint line length to maintain tolerance to plus or minus 3 inches per 10 feet.

3. Paint Guns: Calibrate to simultaneously apply paint binder at uniform rates as specified with an allowable tolerance of plus or minus 1 mil.
4. Bead Guns: Calibrate to dispense glass beads simultaneously at specified rate. Check guns by dispensing glass beads into gallon container for predetermined fixed period of time. Verify weight of glass beads.

C. Other Equipment:
1. For application of crosswalks, intersections, stop lines, legends and other miscellaneous items by walk behind stripers, hand spray or stencil trucks, apply with equipment meeting requirements of this section. Do not use hand brushes or rollers. Optionally apply glass beads by hand.

2.3 SOURCE QUALITY CONTROL

A. Test and analyze traffic paints in accordance with these specifications.

B. Make paints and glass beads available for inspection at manufacturer's factory prior to packaging for shipment. Notify Architect/Engineer at least seven days before inspection is allowed.

C. Allow witnessing of factory inspections and test at manufacturer's test facility. Notify Architect/Engineer at least seven days before inspections and tests are scheduled.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not apply paint to surfaces unit surfaces has cured for 28 days, unless otherwise approved by Architect/Engineer.

3.2 PREPARATION

A. Maintenance and Protection of Traffic:
1. Provide short term traffic control in accordance with Section 01 50 00 - Temporary Facilities and Controls.
2. Prevent interference with marking operations and to prevent traffic on newly applied markings before markings dry.
3. Maintain travel lanes between 7: 00 AM to 9: 00 AM, and between 4: 00 PM and 6: 00 PM. Unless otherwise approved by Architect/Engineer.
4. Maintain access to existing businesses and other properties requiring access.

B. Surface Preparation.
1. Clean and dry paved surface prior to painting.
2. Blow or sweep surface free of dirt, debris, oil, grease or gasoline.
3. Spot location of final pavement markings as specified and as indicated on Drawings by applying pavement spots 25 feet on center.
4. Notify Architect/Engineer after placing pavement spots and minimum three (3) days prior to applying traffic lines.

3.3 EXISTING WORK

A. Remove existing markings in an acceptable manner. Do not remove existing pavement markings by painting over with blank paint. Remove by methods that will cause least damage to pavement structure or pavement surface. Satisfactorily repair any pavement or surface damage caused by removal methods.

B. Clean and repair existing remaining or reinstalled lines and legends.

3.4 APPLICATION

A. Use proper masking, stencils, and application equipment recommended for that purpose by the manufacturer of the approved paint; apply the approved paint in strict accordance with its manufacturer's recommendations.

B. Agitate paint for 1-15 minutes prior to application to ensure even distribution of paint pigment.

C. Dispense paint at approved temperature to wet-film thickness of 15 mils, except dispense edge markings to wet-film thickness of 12 mils.

D. Apply glass beads at rate of six (6) pounds per gallon of paint.

E. Apply markings to indicated dimensions at indicated locations.

F. Prevent splattering and over spray when applying markings.

G. Unless material is track free at end of paint application convoy, use traffic cones to protect markings from traffic until track free. When vehicle crosses a marking and tracks it or when splattering or over spray occurs, eradicate affected marking and resultant tracking, and apply new markings.

H. Collect and legally dispose of residues from painting operations.

I. Install Work in accordance with SSPWC and CMUTCD.

3.5 APPLICATION TOLERANCES

A. Maximum Variation from Wet Film Thickness: 1 mil.

B. Maximum Variation from Wet Paint Line Width: Plus or minus 1/8 inch.

C. Maintain cycle length for skip lines at tolerance of plus or minus six (6) inches per 40 feet and line length of plus or minus three (3) inches per 10 feet unless otherwise approved by Architect/Engineer.

D. Maximum Variation from Specified Application Temperature: Plus or minus 5 degrees F.

3.6 FIELD QUALITY CONTROL

A. Inspect for incorrect location, insufficient thickness, line width, coverage, retention, uncured or discolored material, and insufficient bonding.

B. Repair lines and markings, which after application and curing do not meet following criteria:
   1. Incorrect Location: Remove and replace incorrectly placed patterns.
   2. Insufficient Thickness, Line Width, Paint Coverage, Glass Bead Coverage or Retention: Prepare defective material by acceptably grinding or blast cleaning to remove substantial amount of beads and to roughen marking surface. Remove loose particles and debris. Apply new markings on cleaned surface in accordancewith this Section.
   3. Uncured or Discolored Material, Insufficient Bonding: Remove defective markings in accordance with this Section and clean pavement surface one foot beyond affected area. Apply new markings on cleaned surface in accordance with this Section.

C. Replace defective pavement markings as specified throughout a three (3) year warranted period. Replace markings damaged by anti-skid materials, studded tires, tire chains, chemical deicers, snow plowing or other loss of marking material regardless of cause. When markings are damaged by pavement failure or by Owner's painting, crack sealing, or pavement repair operations, Contractor is released from warranty requirements for damaged work. If this requirement is different in the Contract Documents, then the Contract Documents override this specification.

D. A three member team will evaluate warranty provisions. Team will consist of one member from Owner, one member from Contractor, and third person who is mutually acceptable to Owner and Contractor. Any costs for third person will be equally shared between Owner and Contractor. At least once each year, beginning with year after acceptance, team shall:
   1. Observe Owner taking readings by retroreflectometer, or review Owner records of such evaluation. The number of readings will be as large as necessary to ensure that minimum criteria are satisfied. Readings will be during period from March 15 through October, when pavement is clean and dry.
   2. Determine color fade, discoloration or pigment loss based on visual color comparison between original sample plates with glass beads and in-place pavement markings.
   3. Determine magnitude of material loss.

E. Prepare list of defective areas and areas requiring additional inspection and evaluation to decide where material may need replaced. Provide traffic control as necessary if markings require more detailed evaluation.

F. Replace failed or defective markings in entire section of defective markings within 30 days after notification when any of the following exists during warranty period:
   1. Average retro-reflectivity within any 528 foot section is less than 1225 mcd/m2/1x for white pavement markings and 100 mcd/m2/1x for yellow pavement markings.

2. Marking is discolored or exhibits pigment loss, and is determined to be unacceptable by three member team based on visual comparison with beaded color plates.
3. More than 15 percent of area of continuous line, or more than 15 percent of combined area of skip lines, within any 528 foot section of roadway is missing.

G. Replace pavement marking material under warranty using original or better type material. Continue warranty to end of original three (3) year period even when replacement materials have been installed as specified.

H. When eradication of existing paint lines is necessary, eradicate by shot blast or water blast method. Do not gouge or groove pavement more than 1/16 inch during removal. Limit area of removal to area of marking plus 1 inch on all sides. Prevent damage to transverse and longitudinal joint sealers, and repair any damage according to requirements in Section 32 12 16.

I. Maintain daily log showing work completed, results of above inspections or tests, pavement and air temperatures, relative humidity, presence of any moisture on pavement, and any material or equipment problems. Make legible entries in log in ink, sign and submit by end of each work day. Enter environmental data into log prior to starting work each day and at two additional times during day.

3.7 PROTECTION OF FINISHED WORK

A. Protect painted pavement markings from vehicular and pedestrian traffic until paint is dry and track free. Follow manufacturer's recommendations or use minimum of 30 minutes. Consider barrier cones as satisfactory protection for materials requiring more than 2 minutes dry time.

3.8 SCHEDULES

A. Pavement Markings: Use the following schedule unless otherwise specified in construction drawings.

Items	Location
4 inch White Conventional	Edge
4 inch White Fast Dry	Edge
24 inch White Fast Dry	Stop Line
4 inch Yellow Conventional	Center
4 inch Yellow Fast Dry	Center

END OF SECTION

SECTION 32 11 23
AGGREGATE BASE COURSE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Aggregate base material.

B. Installation standards.

C. Spreading of material.

D. Compacting.

E. Field quality control.

1.2 RELATED SECTIONS

A. Asphaltic Concrete Paving, Patching, Overlay and Replacement is specified in Section 32 12 16.08.

1.3 CLASSIFICATION

A. Aggregate bases are designated as Class 1 or Class 2. The class of aggregate base shall be as indicated.

1.4 MEASUREMENT AND PAYMENT

A. General: Measurement and payment for aggregate base course will be either by the lump-sum method or by the unit-price method as determined by the listing of the bid item for aggregate base course indicated in the Bid Schedule of the Bid Form.

B. Lump Sum: If the Bid Schedule indicates a lump sum for aggregate base course, the Lump-sum method of measurement and payment will be in accordancewith Bidding procedures at time of bidding.

C. Unit Price:

1. If the Bid Schedule indicates a unit price for aggregate base course, the unit price method of measurement and payment will be as follows:
   a. Measurement: Aggregate base course will be measured for payment by the ton or cubic yard, as designated in the contract item, for each class of aggregate placed in the Work. If designated by cubic yard, the quantity for payment will be based on the dimensions, neat lines or pay lines, and sections indicated in the Contract Drawings.
   b. Payment: Aggregate base course will be paid for at the indicated Contract unit prices for the computed quantities as determined by the measurement method specified in Article 1.04.C.1.

1.5 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM C136 Test Method for Sieve Analysis of Fine and Coarse Aggregates
   2. ASTM D421 Practice for Dry Preparation of Soil Samples for Particle-SizeAnalysis and Determination of Soil Constants
   3. ASTM D1241 Specification for Materials for Soil-Aggregate Subbase, Base,and Surface Courses
   4. ASTM D1557 Test Method for Laboratory Compaction Characteristics ofSoil Using Modified Effort
   5. ASTM D2419 Test Method for Sand Equivalent Value of Soils and Fine Aggregate
   6. ASTM D2844 Test Method for Resistance R-Value and Expansion Pressure ofCompacted Soils
   7. ASTM D2922 Test Methods for Density of Soil and Soil-Aggregate in Placeby Nuclear Methods (Shallow Depth)
   8. ASTM D3017 Test Method for Moisture Content of Soil and Soil-Aggregatein Place by Nuclear Methods (Shallow Depth)
   9. ASTM D3744 Test Method for Aggregate Durability Index

B. State of California, Department of Transportation (Caltrans), Standard Specifications, 1992 edition:
   1. Section 26 Aggregate Bases

1.6 SUBMITTALS

A. Product Data: Submit source, gradation, R-value, sand equivalent, and durabilityfor the proposed base course material.

B. Test Reports: Submit plant and field test reports as specified in Articles 2.02 and 3.05 herein.

PART 2 - PRODUCTS

2.1 AGGREGATE BASE MATERIAL

A. Aggregate for the two classes of aggregate bases at the time the base material is deposited on the prepared sub grade or sub base shall conform with ASTM D1241 and the following requirements:
   1. Class 1 Aggregate Base:
      a. Class 1 aggregate base shall consist of crushed stone or gravel, free from vegetable matter and other deleterious substances. Aggregate shall consist of material of which 90 percent by weight shall be crushed particles. Composition of aggregate base, in percentages by weight, shall conform to one of the following gradings, determined in accordance with ASTM C136:

Percentage Passing Sieves

Sieve Sizes	1-1/2 inchMaximum	3/4-inch Maximum
2-inch	100	-----
1-1/2 inch	90-100	100
3/4-inch	50-85	90-100
No. 4	30-45	35-55
No. 30	10-25	10-30
No. 200	2-9	2-9

b. Class 1 aggregate base shall conform to the following additional requirements:

ASTM Test

Tests	Method	Requirements
Resistance (R-Value)	D2844	80 min.
Sand Equivalent	D2419	50 min.
Durability Index	D3744	40 min.

2. Class 2 Aggregate Base:
   a. Class 2 aggregate base shall be free of vegetable matter and other deleterious substances. Coarse aggregate, material contained on the No. 4 sieve, shall consist of material of which 25 percent by weight shall be crushed particles. Class 2 aggregate base shall conform to one of the following gradings, determined in accordance with ASTM C136:

Percentage Passing Sieves

Sieve Sizes	1-1/2 inchMaximum	3/4-inch Maximum
2-inch	100	-----
1-1/2 inch	90-100	-----
1-inch	-----	100
3/4-inch	50-85	90-100
No. 4	25-45	35-55
No. 30	10-25	10-30
No. 200	2-9	3-9

b. Class 2 aggregate base shall conform to the following additional requirements:

ASTM Test

Tests	Method	Requirements
Resistance (R-Value)	D2844	78 min.
Sand Equivalent	D2419	30 min.
Durability Index	D3744	35 min.

2.2 SOURCE QUALITY CONTROL

A. The Contractor shall perform sampling and tests of the aggregate base material in accordance with the ASTM Test Methods herein specified, to determine compliance with specified requirements. Samples shall be taken from material as delivered to the site, and shall be prepared in accordance with ASTM D421, as applicable.

B. Aggregate grading or sand equivalent test shall represent no more than 500 cubic yards of base course material or one day's production, whichever is the greater amount.

PART 3 - EXECUTION

3.1 EXAMINATION

A. The Contractor shall call for an inspection by the Engineer and obtain written acceptance of the prepared sub grade or sub-base before proceeding with theplacement of aggregate base course.

B. The sub grade or sub-base to receive aggregate base course, immediately prior to spreading, shall conform to the compaction and elevation tolerances indicated for the material involved and shall be free of standing water and looseor extraneous material.

3.2 INSTALLATION STANDARDS

A. Aggregate base course shall be applied over the prepared sub grade or sub-base and compacted in accordance with Section 26 of the Caltrans Standard Specifications.

B. Aggregate base course shall have minimum uniform thickness after compaction of dimensions indicated. Where not indicated, compacted thickness shall be 6 inches.

C. All compaction expressed in percentages in this section refers to the maximum dry density as determined by ASTM D1557.

3.3 SPREADING OF MATERIAL

A. Aggregate for base course shall be delivered as uniform mixture of fine and coarse aggregate and shall be spread in layers without segregation.

B. Aggregate base course material shall be free from pockets of large and fine material. Segregated materials shall be remixed until uniform.

C. Aggregate base material shall be moisture-conditioned to near optimum moisture content in accordance with the applicable requirements of Section 17 of the Caltrans Standard Specifications.

D. Aggregate base course 6 inches and less in thickness may be spread and compacted in one layer. For thickness greater than 6 inches, the base course aggregate shall be spread and compacted in two or more layers of uniform thickness not greater than 6 inches each.

3.4 COMPACTING

A. Relative compaction of each layer of compacted aggregate base materialshall be not less than 95 percent as determined by ASTM D1557.

B. Thickness of finished base course shall not vary more than 3/4 inch from the indicated thickness at any point. Base that does not conform to this requirement shall be reshaped or reworked, watered, and recompact to achieve compliance with specified requirements.

C. The surface of the finished aggregate base course at any point shall not vary more than 3/4 inch above or below the indicated grade.

3.5 FIELD QUALITY CONTROL

A. The Contractor shall perform field tests in accordance with ASTM D2922 to determine compliance with specified requirements for density and compaction of aggregate base material, and with ASTM D3017 to determine moisture- content compliance of the installed base course.

B. Testing frequency shall be not less than one test for every 2,000 square feet of base course material, per layer or lift.

END OF SECTION