

WEST LELAND ROAD AND LOVERIDGE ROAD REHABILITATION PROJECT

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10-1.01 MOBILIZATION

Mobilization shall conform to the provisions in Section 9-1.16D, "Mobilization," of the State Standard Specifications and these Specifications.

In general, mobilization shall consist of the work associated with obtaining permits, insurance, and bonds, and the moving onto the site of materials, supplies, construction area signs, restroom facilities, and equipment as required for the proper performance and completion of the work. The bid for Mobilization shall not exceed 10% of the total project cost.

10-1.01A CONSTRUCTION AREA SIGNS

Construction area signs shall be furnished, installed, maintained, and removed when no longer required, in accordance with the provisions in the State of California, Department of Transportation Manual of Uniform Traffic Control Devices (California MUTCD), Chapter 6F, these Technical Specifications, and as directed by the Engineer.

The Engineer shall approve all locations prior to Contractor installing signs.

Construction area sign panels shall be metal, with reflective coating, black lettering on orange background, and mounted on Type II Barricades as described in Section 12-3.10, "Barricades," in the State of California, Department of Transportation Standard Specifications (State Specifications). Construction area sign panels shall conform to Section 12-3.11B(3), "Portable Signs", of the State Specifications. Signs shall be kept clean and in good repair.

10-1.01B PUBLIC NOTIFICATIONS

For the notification of residents and businesses, the Contractor shall prepare notices based on the Contractor's approved project progress schedule and furnish said notices to the Engineer for approval. The hours of distribution of these notices by the Contractor shall be from 8:00 A.M. to 5:00 P.M. Monday through Friday. The Contractor shall not distribute any notices except those approved by the City.

The Contractor shall distribute these notices approximately two (2) weeks in advance of the specific date of work on any street. All residents and businesses on any portion of an affected street included within the limits of work shall receive these notices plus any additional notices during construction or as needed.

Measurement and Payment

The contract lump sum price paid for ***Bid Item 1, Mobilization*** includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in mobilizing, re-mobilizing, notifying the public, furnishing construction area signs, demobilizing, and removing temporary staging as shown on the Plans, as specified in the State Standard Specifications, these special provision Specifications, and as directed by the Engineer.

10-1.02 WATER POLLUTION CONTROL

Water pollution control work shall conform to the provisions in Section 13, "Water Pollution Control Program" of the State Specifications and these Technical Specifications. Refer to Section 3.9 of the General Requirements regarding dust, pollution control, and management of storm, surface and other waters. Contractor shall prepare and submit a BMP Plan for approval by the Engineer prior to start of construction.

Water pollution control work shall conform to the requirements in the "Construction Site Best Management Practices (BMPs) Manual," and addenda thereto issued up to, and including, the date of advertisement of the project. These manuals are hereinafter referred to respectively as the "Preparation Manual" and the "Construction Site BMPs Manual," and collectively, as the "Manuals." Copies of the Manuals may be obtained from the Department of Transportation, Material Operations Branch, Publication Distribution Unit, and may also be obtained from the Department's Internet website at: <http://www.dot.ca.gov/hq/construc/stormwater>.

The Contractor shall know and fully comply with applicable provisions of the Manuals, and Federal, State, and local regulations and requirements that govern the Contractor's operations and storm water and non-storm water discharges from both the project site and areas of disturbance outside the project limits during construction. Attention is directed to Sections 7-1, "Laws to be Observed" of the Specifications.

Water pollution control requirements shall apply to storm water and non-storm water discharges from areas outside the project site which are directly related to construction activities for this contract including, but not limited to, staging areas, storage yards and access roads. The Contractor shall comply with the Manuals for those areas and shall implement, inspect and maintain the required water pollution control practices. Installing, inspecting and maintaining water pollution control practices on areas outside the project limits not specifically arranged and provided for by the Town for the execution of this contract, will not be paid for.

The Contractor shall be responsible for penalties assessed or levied on the Contractor or the City as a result of the Contractor's failure to comply with the provisions in this section "Water Pollution Control" including, but not limited to, compliance with the applicable provisions of the Manuals, and Federal, State and local regulations and requirements as set forth therein.

Penalties as used in this section shall include fines, penalties and damages, whether proposed, assessed, or levied against the City or the Contractor, including those levied under the Federal Clean Water Act and the State Porter-Cologne Water Quality Control Act, by governmental agencies or as a result of citizen suits. Penalties shall also include payments made or costs incurred in settlement for alleged violations of the Manuals, or applicable laws, regulations, or requirements. Costs incurred could include sums spent instead of penalties, in mitigation or to remediate or correct violations.

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Notwithstanding any other remedies authorized by law, the City may retain money due the Contractor under the contract, in an amount determined by the City, up to and including the entire amount of penalties proposed, assessed, or levied as a result of the Contractor's violation of the Manuals, or Federal or State law, regulations or requirements. Funds may be retained by the City until final disposition has been made as to the penalties. The Contractor shall remain liable for the full amount of penalties until such time as they are finally resolved with the entity seeking the penalties.

Retention of funds for failure to conform to the provisions in this section, "Water Pollution Control," shall be in addition to the other retention amounts required by the contract. The amounts retained for the Contractor's failure to conform to provisions in this section will be released for payment on the next monthly estimate for partial payment following the date when an approved Stormwater Management Plan (SWMP) has been implemented and maintained, and when water pollution has been adequately controlled, as determined by the Engineer.

When a regulatory agency identifies a failure to comply with the Manuals, or other Federal, State or local requirements, the City may retain money due the Contractor, subject to the following:

1. The City will give the Contractor seventy-two (72) hours' notice of the City's intention to retain funds from partial payments which may become due to the Contractor prior to acceptance of the contract. Retention of funds from payments made after acceptance of the contract may be made without prior notice to the Contractor.

During the first progress payment period after that the Contractor fails to conform to the provisions in this section, "Water Pollution Control," the City may retain an amount equal to twenty-five percent (25%) of the estimated value of all contract work performed on the entire contract.

The Contractor shall notify the Engineer immediately upon request from the regulatory agencies to enter, inspect, sample, monitor, or otherwise access the project site or the Contractor's records pertaining to water pollution control work. The Contractor and the City shall provide copies of correspondence, notices of violations, enforcement actions or proposed fines by regulatory agencies to the requesting regulatory agency.

Measurement and Payment

The contract lump sum price for ***Bid Item 2 – Environmental Protection*** includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in the Water Pollution Control, as shown on the Plans, as specified in the State Standard Specifications and these Technical Specifications, and as directed by the Engineer.

10-1.03 PRESERVATION OF PROPERTY

The Contractor's attention is directed to Section 5-1.36 "Property and Facility Preservation" of the State Standard Specifications. Building, fences, signs, walls, headers, curbs, gutters,

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sidewalks, driveways, curb ramps, pavements, hardscape, irrigation systems, drains, utilities, and any other features which are not designated to be removed shall be protected in place. Any damage to these facilities shall be repaired by the Contractor entirely at his or her expense as directed by the Engineer.

Existing trees, shrubs, and other plants, that are not to be removed and are injured or damaged by reason of the Contractor's operations, shall be replaced by the Contractor at his/her cost. The minimum size of tree replacement shall be 24-inch box and the minimum size of shrub replacement shall be 15 gallons. Replacement ground cover plants shall be from flats and shall be planted 12 inches on center. The replacement specimen must be of the same species. All damaged vegetation is to be disposed of in a legal manner as required by these Specifications.

Underground irrigation systems, outside of the public right-of-way, which are damaged or removed during construction, shall be restored within 48 hours of the first destruction or removal in order to be functional. The Contractor shall be responsible for all damage to existing vegetation to remain due to lack of irrigation from broken irrigation lines. The landscaping and any other facilities shall be replaced in kind or as approved by the Engineer.

It shall be the contractor's responsibility to ascertain the location of all utilities, including drains, manholes and monuments. The Contractor shall preserve all existing benchmarks, survey control points, reference points, and other permanent points within the project limits. Any of the aforementioned controls that are damaged will be replaced by the Contractor's licensed Land Surveyor at no cost to the City.

Additionally, the Contractor shall institute measure to preserve and protect buildings, fences, signs, hardscape, and underground utilities located adjacent to the work area. All damaged items shall be replaced in kind or as approved by the Engineer.

10-1.03A REPLACEMENT OF DAMAGED SURFACES

All concrete curbs, gutters, driveways, sidewalks, curb ramps or other surfaced areas which are broken or damaged shall be reconstructed by and at the expense of the Contractor, of the same kind of material and of the same dimensions as the original work or as directed by the Engineer, with the minimum requirement that concrete as specified herein shall be used. Repairs shall be made by removing and replacing the entire portion between joints or scores and not by refinishing the damaged part.

10-1.03B APPEARANCE OF WORK

All work shall match the appearance of existing improvements to the satisfaction of the Engineer.

10-1.03C UTILITIES

The Contractor shall telephone Underground Service Alert (USA) at (800) 227-2600 or 811 a minimum of two working days prior to start of work so that underground facilities can be approximately located and marked on the surface by the various utilities.

The Contractor shall, prior to start of construction, excavate and pothole and determine the exact locations, both horizontally and vertically, of all utilities within the roadway in the Project area. Any utilities that are in conflict with the proposed work shall be relocated by the

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respective utility companies. If any utilities are in conflict with the proposed work, the Contractor shall notify the Engineer in writing of the location and elevation of the utility line that is in conflict. The Contractor shall coordinate all work with the utility companies under the direction of the Engineer.

The Contractor will be allowed additional working days equal to the number of working days that the relocation of utilities delays his work. No compensation will be allowed for idle time of equipment during the utility relocation.

10-1.03D MATERIALS

Materials and quality of work shall conform to those specified by the City Standards, the State Standard Plans and Specifications, and these Specifications.

Measurement and Payment

Full compensation for complying with Section 10-1.03 shall be considered as included in the contract prices paid for the various items of work and no separate payment will be made therefor.

10-1.04 TREE PRESERVATION, TREE TRIMMING/ROOT PRUNING

If existing trees or shrubs (including private trees) encroach into the public right-of-way and obstruct the Contractor's operations, the Contractor shall request permission from the Engineer and City's Arborist to trim existing trees or shrubs at least five (5) working days in advance of the date of scheduled tree trimming. All tree and shrub trimming must have prior approval of the Engineer and City's Arborist and shall be performed by the Contractor or his subcontractor possessing a **C-27, Landscaping Contractor's License** or a **C-61, Limited Specialty Contractor's License**. A special notice pertaining to the tree trimming shall be delivered to the adjacent home or business at least five (5) working days prior to the trimming of the adjacent tree or shrub. The special notice shall be approved by the Engineer prior to delivery to the resident or business.

Tree root pruning shall be the responsibility of the Contractor. Tree roots shall be removed to a depth of six (6) inches below subgrade. Tree roots are to be cut neatly with a saw, or shears to prevent disease to the tree. Any root three (3) inches or larger shall be brought to the attention of the Engineer for further instructions.

Some locations may need extensive root work. The Contractor may investigate the locations prior to bidding.

Measurement and Payment

Full compensation for complying with the above provisions as they relate to tree preservation and tree or root pruning shall be considered as included in the contract prices paid for the various items of work and no separate payment will be made therefor.

10-1.05 TRAFFIC CONTROL

Maintaining safe and efficient traffic flow through the work zone is a high priority for the City. For the purpose of this section, traffic relates to cars, trucks, buses, pedestrians, and bicycles. The traffic control described in this section shall be coordinated with other City

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projects. The Contractor's shall conform to Sections 7-1.03 "Public Convenience," 7-1.04 "Public Safety" and Section 12 "Temporary Traffic Control" of the State Standard Specifications, insofar as they may apply, and these Specifications.

Traffic Control shall comply with the following:

1. Standard single lane closure on West Leland Road shall be restricted to between the hours of 8:30 A.M. and 3:30 P.M., Monday through Friday, unless allowed by the Engineer. Work area traffic control requiring the closure of multiple lanes or the detour of traffic (within signalized intersections) shall be limited to the hours of 9:00 AM and 3:00 PM.
2. No work is allowed on Saturday, Sunday or Holidays.
3. Night work will be allowed between the hours of 9 P.M. and 4 A.M.
4. During lane closure operations, a minimum of one flagman controlled and unobstructed paved traffic lane, not less than 11 feet wide, shall be open for use by public traffic.
5. The Contractor shall provide flagman and other personnel to control traffic at all times.
6. The Contractor shall provide flashing arrow signs (FAS) at lane closures on arterial roads.
7. The Contractor shall prepare a detailed traffic control plan for the Engineer's advance approval; no work involving traffic control may occur until the Engineer approves the Plan.
8. All signs and other warning devices (including construction and advance warning signs placed beyond the limits of work) shall be provided and maintained by the Contractor at his or her expense, and shall remain his or her property after the completion of the contract.
9. The Contractor shall provide all flaggers at his or her expense.

10-1.05A TRAFFIC CONTROL PLAN SUBMITTAL

The Contractor shall submit a "Traffic Control Plan" in conformance with Standard Plan, "Traffic Control System For Lane Closure on Multilane Conventional Highway", showing the proposed exact location of signs, cone taper limits, and flashing arrow sign for review and acceptance by the Engineer. Lanes shall not be closed until the traffic control plan has been reviewed and accepted by the Engineer. Plan shall also be in compliance with the 2014 CA MUTCD (Revision 4).

Contractor shall submit a "Pedestrian Traffic Control Plan" showing pedestrian detours or diversions that complies with 2014 CA MUTCD (Revision 4) including but not limited to Chapter 6D, Chapter 6F. Section 6F.74, Chapter 6G. Section 6G.05, and Chapter 6H, Typical Application 28 and Caltrans Pedestrian Facilities Handbook downloadable from http://www.dot.ca.gov/hq/construc/safety/Temporary_Pedestrian_Facilities_Handbook.pdf.

All traffic control plans shall be prepared by a registered civil or traffic engineer, and shall provide sufficient information and details to show typical lane closures, channelizing, proposed detours, locations and usage of flagmen, typical construction zone signing, provisions for pedestrians, etc. The traffic control plan shall show in detail the proposed staging and sequencing of the work together with the proposed traffic control system for each work task. The proposed traffic control system shall, in all respects, satisfy the requirements of these Special Provisions. The Engineer will review the proposed traffic control plan and return it to the Contractor for any necessary revisions or corrections. The Contractor shall

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revise and resubmit the plan to the Engineer, and this process shall be repeated, until the proposed traffic control plan is accepted by the Engineer. The Contractor will not be permitted to perform any lane closures or implement any part of the traffic control plan until it has been accepted by the Engineer.

All weather and accessible access for pedestrians shall be provided at all times in and through the construction area. When a sidewalk, driveway or curb ramp is removed, the area shall be fenced and signage provided to direct pedestrians to an alternate ADA compliant route. Pedestrians shall be routed to temporary crossing points which shall be submitted to the Engineer for review and approval.

In locations where the sidewalk, driveway or curb ramp are removed, at the end of the work day the Contractor shall provide a temporary ADA compliant sidewalk, driveway or curb ramp fabricated from an accessible surface, including wood, asphalt or metal. A temporary access plan shall be submitted to the Engineer for review and approval 10 days prior to removal of the sidewalk, driveway or curb ramp.

No demolition work shall begin without the Engineer's approval of the Temporary Traffic Control Plan.

10-1.05B ASPHALT TAPERS

The Contractor shall place hot mix asphalt tapers as described in Section 10-1.10A "Full Width Pavement Milling" of these special provisions at all vertical surfaces open to traffic (i.e. driveways and conform limits) and at roadway utility structures. The temporary taper shall be removed and disposed before installation of the overlay or final lift.

10-1.05C CONSTRUCTION AREA SIGNS

Once construction starts, the Contractor shall furnish and install construction area signs to inform motorists, pedestrians, and bicyclists of work in the streets and sidewalks. These signs may include, but are not limited to, "Road Construction Ahead", "Detour Ahead", and "Road Closed". Construction area signs shall be furnished, installed, maintained, and removed when no longer required in accordance with the provisions in Section 12, "Temporary Traffic Control" of the State Standard Specifications and these Specifications. Construction area signs shall be metal, with reflective coating, black on orange, and securely mounted. Signs shall be kept clean and in good repair. The Contractor's traffic control plan shall show the location of the signs.

The Contractor shall be responsible for providing, placing, and installing all construction area signs. The signs shall not be installed on trees, utility poles, private property, traffic signals, or any other appurtenance, unless approved by the Engineer.

10-1.05D NO PARKING SIGNS

The Contractor's traffic control plans shall show the locations where on street parking is to be temporarily removed. If approved by the Engineer, the Contractor shall post "NO PARKING" signs along the street to be closed not less than 72 hours in advance of the time he or she wishes to commence operations. The time and date must be written on each sign that is posted. Signs must be posted no more than 50 feet apart along the area to be cleared of vehicles. Signs shall be removed upon completion of the work in any given area or when there will be a delay between types of work (underground, concrete, pavement rehabilitation,

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etc.).

The Contractor shall notify the Engineer after posting said "NO PARKING" signs 72 hours before the prohibition is to become effective.

10-1.05E TRAFFIC CONTROL SYSTEM

The Contractor shall implement the traffic control system as approved by the Engineer. If warranted by field conditions, the Contractor shall adjust the system as directed by the Engineer. The Contractor shall provide and implement all traffic handling devices and equipment as described in Sections 12-3 "Temporary Traffic Control Devices" and 12-4 "Maintaining Traffic" of the State Standard Specifications.

If any component in the traffic control system is displaced, or ceases to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair the component to its original condition or replace the component, and shall restore the component to its original location.

At the end of each workday, the Contractor shall open all streets for access and remove traffic control devices except for those providing advanced warning near work zones. Traffic control devices shall not be stored within public streets.

The Contractor shall allow traffic flow in two directions at all times providing two travel lanes of at least 11 feet each. When this is not possible, the Contractor shall provide flaggers to control traffic. The cost for flaggers is the Contractor's responsibility.

All excavations shall be backfilled or covered with steel trench plates suitable for traffic loading, at the end of each day's work. Trench plates shall be securely anchored in place and have temporary asphalt ramps all around. No open excavation of any depth will be permitted to remain overnight.

The Contractor shall provide access to all driveways within the work zone at all times.

10-1.05F TEMPORARY PEDESTRIAN ACCESS

All weather and accessible access for pedestrians shall be provided at all times in and through the construction area. When a sidewalk is removed, the area should be fenced and signage provided to direct pedestrians to an alternate route. Pedestrians shall be routed to temporary crossing points as approved by the Engineer. However, the route shall not exceed one block.

At the end of each work day, the Contractor shall make provisions to allow safe access to pedestrians through the work zone.

In locations where the sidewalk is removed and entrances to private property are obstructed, the Contractor shall provide a temporary sidewalk fabricated from wood or asphalt. The temporary sidewalk shall comply with the Americans with Disabilities Act. A temporary access plan shall be submitted to the Engineer for review and approval 10 days prior to removal of the sidewalk.

The Contractor shall provide an alternate circulation path shall be provided whenever the

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existing pedestrian access route in the public right-of-way is blocked by construction, alteration, maintenance, or other temporary conditions.

Where possible, the alternate circulation path shall parallel the disrupted pedestrian access route, on the same side of the street. The path shall minimize the length of detour and shall be approved by the Engineer before implementation. The alternate circulation path shall be all weather and compliant with the Americans with Disabilities Act. Where the alternate circulation path is adjacent to potentially hazardous conditions, the path shall be protected with barricades.

10-1.05G TEMPORARY PAVEMENT DELINEATION

When the Contractor removes striping or markings, he or she shall immediately place temporary delineation prior to opening the traveled way to public traffic.

Surfaces on which temporary pavement delineation is to be applied shall be cleaned of all dirt and loose material and shall be dry when the pavement delineation is applied. The Contractor shall perform all work necessary to establish satisfactory alignment for temporary pavement delineation. Temporary pavement delineation that is damaged from any cause during the progress of the work shall be immediately repaired or replaced by the Contractor at their expense.

The Contractor shall not use paint on pavement that is to remain in place. In this case, the Contractor shall use Temporary Traffic Stripe and Pavement Marking Tape. Tape shall be applied to a clean dry surface and rolled slowly with a rubber tired vehicle or roller to ensure complete contact with the pavement surface in accordance with the manufacturer's recommendations. Tape shall not be applied over existing stripes or markings. Completed stripes shall be straight on tangent alignments and shall be on a true arc on curved alignments.

Temporary pavement markers may be used to simulate the striping shown on the approved traffic control plans. The use of temporary pavement markers shall conform to the typical details for pavement markers and traffic lines shown in the State Standard Plans and as determined by the Engineer.

When no longer required for the direction of public traffic, as determined by the Engineer, the temporary traffic stripe and pavement marking tape and temporary pavement markers, applied to existing pavement, the top layer of new pavements or any other paved surface where the previously placed pavement delineation conflicts with the new traffic pattern, shall be removed and disposed of in accordance with the provisions of these Specifications, and all lines and marks used to establish the alignment for the temporary traffic stripes, pavement markings and temporary pavement markers shall be removed from the pavement.

10-1.05H TEMPORARY PAVING

To accommodate the stage construction, the Contractor may need to install temporary asphalt paving to provide a uniform path of travel. The Contractor shall place hot mix asphalt pavement in accordance with the Section 39 "Asphalt Concrete" of the State Standard Specification as necessary to provide two lanes of travel in each direction, turn lanes, access through intersections, and accommodate any vertical transitions. In locations shown in the Plans, the Contractor shall additionally provide, place, and compact class II aggregate base

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to facilitate the installation of the temporary asphalt paving. When a vertical difference in excess of 1.0 inch (i.e. between new pavement and old pavement) exists either parallel or perpendicular to the vehicle's path of travel, the Contractor shall place hot mix asphalt pavement allowing for a smooth transition to the satisfaction of the Engineer. The Contractor shall be responsible for maintaining the asphalt pavement for the duration of the project. The Contractor shall grind, remove, and dispose of the asphalt as necessary to accommodate the staging.

Measurement and Payment

The contract lump sum price for ***Bid Item 3, Traffic Control*** includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in the traffic control, including preparation of traffic control plans, providing signs and flaggers, implementing the traffic control system, placing temporary delineation, installation of temporary paving, and removal of temporary paving, as shown on the Plans, as specified in the State Standard Specifications and these Special Provision Specifications, and as directed by the Engineer.

10-1.06 DISPOSAL OF WASTE MATERIALS

The City has not made arrangements for disposal of material, which may include but is not limited to soil, concrete, asphalt, pipe, rock, and vegetation. The Contractor shall dispose of all excess and unsuitable material in a legal manner.

Excess asphalt grindings up to 750 cubic yards shall be salvaged and hauled to the Water Treatment Plant located at 300 Olympia Drive, Pittsburg, CA.

The City has not completed testing of soil within the project limits. The Contractor is responsible for disposing of all excess soil in a legal manner at a facility with all-weather access. The Contractor should assume all soil must be disposed in a Class II landfill. The Contractor shall be responsible for testing soil as required by the disposal site.

The Contractor shall dispose of material such as asphalt, concrete, organic, and wood in a recycling facility.

The Contractor shall be responsible for disposing asphalt containing reinforcing fabric. All other materials shall be disposed in a legal facility.

Measurement and Payment

Full compensation for complying with Section 10-1.06 shall be considered as included in the contract prices paid for the various items of work and no separate payment will be made therefor.

10-1.07 ADJUST UTILITIES TO GRADE

This work shall consist of adjusting City owned facilities such as storm drain manholes, storm drain valves and cleanouts, sanitary sewer manholes and rodding inlets, traffic signal detector handholes, water valve frames and water facility pull boxes to below the grading plane in excavation (roadway inlay) areas, and then to finished grade following placement of the top layer of asphalt concrete pavement. The Contractor shall adjust these City owned facilities to

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below the planed surface prior to cold planing/excavation operation.

Work by the Contractor shall include locating, referencing, and setting sufficient marks prior to adjusting facilities below the planed surface or grading plane to enable their subsequent retrieval by the Contractor. The Contractor shall reference and set marks for all City owned facilities. The Contractor shall submit a plan to the Engineer at least forty-eight (48) hours in advance of any excavation showing all reference points and offset distances set for each frame, cover and monument.

Adjustments below the planed surface shall include placement of a temporary false bottom in sanitary sewer manholes, removal of rings as required, placing and securing an acceptable temporary lid or cover below the planed surface or grading plane elevations, and placement of temporary asphalt concrete over and around the temporary lid or cover as required to allow for the passage of vehicular traffic prior to and following cold planing or excavation operations.

The final adjustment to finished grade of all manhole frames shall consist of resetting the manhole frame to grade by adjusting and/or reconstructing the existing concrete riser rings within the throat area. The existing concrete collar shall be reconstructed to conform to City Standard Detail SD-507, "Precast Manhole and Type 1 Base", and the existing concrete riser rings shall be replaced, if damaged. The reconstructed sections shall be at least equal in quality to the existing structure. In no case shall the precast barrel section be disturbed. Cast iron extension or adjustment rings will not be allowed in the adjusted structure.

Water valve frames shall be adjusted to finished grade by removing the existing concrete collar, raising the frame and cover to finished grade, and constructing a new concrete collar. For all adjustments, the top surface of the adjusted facility shall be within 1/8 inch of the adjacent finished grade. Adjustment to final grade shall not be made until the top layer of paving has been completed immediately surrounding it.

This work shall also include placement of temporary asphalt around the manholes/valves if the permanent asphalt concrete patching cannot be placed the same day the facility is adjusted to finished grade.

The Contractor shall cooperate and coordinate all adjustments with the various utility owners who will be adjusting their facilities. In addition, the Contractor shall arrange with the utility owners, in a timely manner, the adjustments of their facilities.

10-1.07A ADJUST PULL BOX TO GRADE

The work shall consist of adjustment of traffic signal, street light, and other pull boxes to grade as part of the reconstruction of pavement, curb ramps, and sidewalk. Each box shall be set on four (4) bricks, one (1) brick at each corner of the box. The bricks shall be set on firm soil to avoid settlement of the box.

All existing pull boxes requiring adjustment shall be reused in the project and the Contractor shall take care not to damage them. Any pull boxes damaged as a part of the Contractor's activities shall be replaced at the Contractor's expense.

Measurement and Payment

The quantities will be measured and paid as follows:

- a) ***Bid Item 4, Adjust Sanitary Sewer Manhole Cover to Grade*** paid per **EACH**
- b) ***Bid Item 5, Adjust Storm Drain Manhole Cover to Grade*** paid per **EACH**
- c) ***Bid Items 6 and A1-1, Adjust Communications Manhole Cover to Grade*** paid per **EACH**
- d) ***Bid Item 7, Adjust Water Valve Box and Cover to Grade*** paid per **EACH**
- e) ***Bid Item 8, Adjust Gas Valve Box and Cover to Grade*** paid per **EACH**
- f) ***Bid Item 9, Adjust Storm Drain Box and Cover to Grade*** paid per **EACH**
- g) ***Bid Items 10 and A1-2, Adjust Monument Box and Cover to Grade*** paid per **EACH**
- h) ***Bid Item 11, Adjust Traffic Signal Box and Cover to Grade*** paid per **EACH**
- i) ***Bid Item 12, Adjust Electrical Box and Cover to Grade*** paid per **EACH**

The contract unit price paid for these items shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in the connection, including excavation, disposal of unsuitable materials, and grouting, complete in place, as specified in the City Standard Plans , State Standard Specifications and these Special Provisions Specifications, and as directed by the Engineer.

10-1.08 PORTLAND CEMENT CONCRETE

Attention is directed to Section 10-1.06, "Disposal of Waste Materials" for removal and disposal of materials required for this work.

Concrete curb, gutter, sidewalk, driveway, valley gutter, and curb ramp to be removed shall be sawcut and removed at nearest weakened plane joints or removed to the nearest construction joints as marked by the Engineer in the field. Concrete curb, gutter, sidewalk, driveway, valley gutter, and curb ramp removal shall include removing enough existing native or base material to allow for placement of the specified thickness of new aggregate base material and PCC improvement. The rubble from the excavation shall be removed immediately and the area left evenly graded. Subgrade shall be compacted to ninety-five percent (95%) of maximum dry density as determined by ASTM D1557.

The Contractor shall sawcut existing AC pavement and any underlying materials adjacent to curb or gutter lip (including gutter for curb ramps) to allow for construction of concrete forms. The sawcut line on pavement shall be at least twelve (12) inches beyond the concrete edge. Slurry from sawcut operation shall be removed sufficiently by vacuuming or similar method from the pavement surface and shall be prevented from entering any waterway or storm drain system in accordance with best management practices. Rubble from the excavation shall be removed immediately. Pavement replacement shall meet the requirements of Section 10-1.16, "Hot Mix Asphalt," of these Technical Specifications.

Whenever existing concrete curb, gutter, driveway, sidewalk, valley gutter, and curb ramp is removed, the Contractor shall place Type II barricades with flashing lights at the location of the removed facility. Spacing for Type II barricades shall be no greater than ten (10) feet on center for curb and gutter. Caution tape shall be attached to barricades if needed to delineate the area. Only two curb ramps shall be worked on at one intersection at any given time.

All new concrete work shown on the Plans or described in these Technical Specifications

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shall conform to City of Pittsburg Standard Plans, unless otherwise shown or specified on the Plans and these Technical Specifications. This work shall include placing new or recycled aggregate base under new concrete improvements.

All new concrete work to be placed on aggregate base shall be founded on a minimum four (4)-inch thick layer of aggregate base. Aggregate base shall be Class 2 Aggregate Base conforming to Section 10-1.12, "Aggregate Base," of these Technical Specifications. Subgrade and aggregate base shall each be compacted to achieve a relative compaction of not less than ninety-five percent (95%).

Where subgrade needs to be filled or removed and backfilled for any reason (including root pruning, unsuitable material removal, design change, etc.), backfill material shall be Class 2 Aggregate Base compacted to 95% relative compaction per Section 10-1.12, "Aggregate Base," of these Technical Specifications. Removal of roots and/or other debris shall be performed prior to compaction of subgrade.

Smooth dowels #4x12" shall be installed at the junction between new and existing concrete facilities. All dowels shall have a minimum 2.5" concrete cover. The dowels shall be placed in drilled holes, epoxied and spaced in conformance with the standard detail. Full compensation for installing dowels shall be considered as included in the various concrete items of work and no additional compensation will be allowed therefor.

The Contractor shall submit a concrete mix design a minimum of ten (10) working days prior to any mixing and/or placing of concrete. Concrete mix design must be approved prior to start of work.

Unless otherwise specified and if the repair location allows, all curb, gutter, and sidewalk shall be placed in a monolithic pour.

For any gutter replacement, if the slopes do not appear to maintain drainage after form boards have been set, notify the Project Engineer prior to ordering concrete. If positive flow of stormwater cannot be demonstrated, the work will be rejected.

A clear curing compound shall be used to cure all concrete. Pigmented curing compound shall not be used on this project.

Soil disturbance shall be minimized and limited to those areas that require treatment. All existing vegetation within the project limits not designated for removal shall be protected, especially mature shrubs and trees. Under no circumstances shall any disturbance be allowed to occur outside the work areas identified on the plans or in the field by the Engineer. Any vegetation or irrigation damaged during construction shall be repaired or replaced and any areas disturbed or compacted during construction shall receive full soil conditioning and revegetation treatment at the Contractor's expense as directed by the Engineer. Other areas shall be reseeded to as good or better condition as soon as possible. When irrigation systems are damaged the Contractor shall repair these systems the same day they are damaged. The Contractor shall test the system after the repair is completed to ensure the system is fully functional. This work shall be considered as included in the bid item price for the various concrete items and no additional compensation will be allowed therefor.

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Work constructed for this project shall meet current ADA standards and shall be in first class condition prior to acceptance of the Project and shall remain in first class condition through the warranty period for the project. Contractor recognizes that it is the City's policy that first class condition prior to acceptance means that the improvements are free from cracks or other defects, and that any repairs necessary to return the improvements to first class condition prior to acceptance or within the warranty period are the responsibility of Contractor. Contractor agrees to cause to be repaired to the satisfaction of the Engineer, any cracks or other damage deemed by the Engineer to be in need of repair.

Detectable Warning Surface

Detectable warning surfaces shall consist of raised truncated domes constructed or installed on curb ramps, in conformance with the details shown on the plans and these Technical Specifications. The detectable warning surface shall be prefabricated.

Prefabricated detectable warning surface shall be constructed of an epoxy polymer composite with an ultra violet stabilized coating employing aluminum oxide particles in the truncated domes, in conformance with the requirements established by the Department of General Services, Division of State Architect and be installed in conformance with the manufacturer's recommendations.

Detectable warning surfaces to be installed at curb ramps to be retrofitted shall be set in wet concrete. The finished surfaces of the detectable warning surface shall be free from blemishes.

The manufacturer shall provide a written five-year warranty for prefabricated detectable warning surfaces, guaranteeing replacement when there is defect in the dome shape, color fastness, sound-on-cane acoustic quality, resilience, or attachment. The warranty period shall begin upon acceptance of the contract.

Prefabricated detectable warning surface shall meet or exceed the following criteria:

1. Water Absorption: 0.35% maximum, when tested in accordance with ASTM D570.
2. Slip Resistance: 0.90 minimum combined wet/ dry static coefficient of friction on top of domes and field area, when tested in accordance with ASTM C1028.
3. Compressive Strength: 18,000 psi minimum, when tested in accordance with ASTM D695.
4. Tensile Strength: 10,000 psi minimum, when tested in accordance with ASTM D638.
5. Flexural Strength: 24,000 psi minimum, when tested in accordance with ASTM C293.
6. Gardner Impact: 450 inch-pounds per inch minimum, when tested in accordance with Geometry "GE" of ASTM D5420.
7. Chemical Stain Resistance: No reaction to 1% hydrochloric acid, urine, calcium chloride, stamp pad ink, gum and red aerosol paint, when tested in accordance with ASTM D543.
8. Wear Depth: 0.03" maximum, after 1000 abrasion cycles of 40 grit Norton Metallite sandpaper, when tested in accordance with ASTM D2486-Modified.
9. Flame Spread: 25 maximum, when tested in accordance with ASTM E84.
10. Accelerated Weathering: No deterioration, fading or chalking for 2000 hours, when tested in accordance with ASTM D2565.

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In addition to the requirements above, prefabricated detectable warning surface adhered to concrete shall meet or exceed the following performance criteria:

1. Accelerated Aging and Freeze Thaw of Adhesive System: No cracking, delamination, warping, checking, blistering, color change, loosening, etc. when tested in accordance with ASTM D1037.
2. Salt and Spray Performance: No deterioration after 100 hours of exposure, when tested in accordance with ASTM B117.

All protective plastic coverings shall be removed from the detectable warning surface prior to opening for pedestrian traffic.

Measurement and Payment

The quantities for Portland Cement Concrete will be measured and paid as follows:

- a) ***Bid Item 13, Remove and Replace PCC Standard Curb and Gutter*** paid per **LINEAR FOOT**
- b) ***Bid Item 14 and A2-1, Remove and Replace PCC Sidewalk*** paid per **SQUARE FOOT**
- c) ***Bid Item 15, Remove and Replace PCC Valley Gutter*** paid per **SQUARE FOOT**
- d) ***Bid Item 16, Remove PCC Sidewalk, Backfill w/ Topsoil & Mulch*** paid per **SQUARE FOOT**
- e) ***Bid Item 17, PCC Curb Ramp*** paid per **EACH**
- f) ***Bid Item 18, Detectable Warning Tile Retrofit*** paid per **EACH**

The contract prices paid for Portland cement concrete work shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work involved including, but not limited to saw cutting, asphalt removal, earthwork, disposal of unsuitable materials, preparing the subgrade, furnishing and compacting the aggregate base, doweling into the existing concrete, furnishing and placing concrete, furnishing and placing curing compound, asphalt plugs, conform grading, furnishing and installing detectable warning surface, and landscape/hardscape replacement as shown on the Plans and as directed by the Engineer and no additional compensation will be allowed therefor.

10-1.09 ASPHALT PATCHING AT SUBGRADE FAILURES (BASE REPAIRS)

This work shall consist of the removal of existing pavement materials, and any underlying materials, to the depth indicated on the Plans, and replacement with compacted hot-mix asphalt concrete (HMA) at locations marked in the field and as directed by the Engineer.

The minimum width of base repairs shall be four (4) feet. Base repair longitudinal edges shall not be placed in the vehicle inner or outer wheelpaths. The base repair dimensions indicated on the Plans are approximate. Actual quantities may be greater or less than the quantities shown on the bid schedule. Changes in quantities, either up or down, will not result in a change of the unit price entered in the Bid Schedule.

Contractor shall sweep all milled surfaces sufficiently to be able to identify failed areas and provide traffic control suitable for Engineer to safely mark base repair locations.

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After base repairs have been marked in the field, the Contractor shall arrange for and conduct a field review of each base repair location with the Engineer. During the field review, the Engineer and Contractor shall record the agreed upon dimensions for each base repair at each location. The size of the base repairs shall then not vary from what is recorded during the field review unless first agreed to in writing by the Engineer. Additional compensation shall not be allowed for base repairs in excess of the sizes agreed to during the field review.

The Contractor shall remove existing asphalt concrete pavement and any underlying materials either by milling or by saw-cutting with a power-driven saw. Slurry from sawcut operation shall be removed sufficiently by vacuuming or similar method from the pavement surface and shall be prevented from entering any waterway or storm drain system in accordance with best management practices. Rubble from the excavation shall be removed immediately.

Further excavation (over-excavation) beyond the depths specified on the Plans may be required by soil conditions (i.e. yielding subgrade) or the Engineer. For over-excavation of unsuitable materials, refer to Section 10-1.14, "Subgrade Over-Excavation". This section shall supersede Section 19-1.03B, "Unsuitable Material," of the State Specifications.

Existing asphalt concrete surfacing and underlying base materials removed from vehicular travel lanes during a work period shall be replaced with permanent HMA before the lane is re-opened to public traffic.

Surfacing and base materials shall be removed without damage to adjacent asphalt surfacing that is to remain in place. Damage to pavement that is to remain in place shall be repaired to a condition satisfactory to the Engineer, or the damaged pavement shall be removed and replaced with new HMA if ordered by the Engineer. Repairing or removing and replacing pavement damaged outside the limits of pavement to be replaced shall be at the Contractor's sole expense and will not be measured nor paid for. If during any of the operations the Contractor damages a monument or manhole or other underground utility facility, the Contractor shall be responsible for the repair of those facilities including, but not limited to, replacing any monuments knocked off center point in accordance with the requirements of the Engineer. The Contractor shall return all facilities to their proper places at his/her sole expense.

Removed materials shall be disposed of per Section 10-1.06, "Disposal of Waste Materials," of these Technical Specifications.

The material remaining in place, after removing surfacing and, if encountered, base to the required depth, shall be graded to a plane, watered, and compacted to ninety-five percent (95%) relative compaction. The finished surface of the remaining material shall not extend above the grade established by the Engineer.

Base repair areas that are low as a result of excavation beyond the required depth shall be filled with HMA at the Contractor's expense. HMA shall be Type A and be produced at a central mixing plant. The aggregate shall conform to the 3/4-inch aggregate gradation as specified in Section 39-2.02B(4)(b), "Aggregate Gradations," of the State Specifications.

Asphalt binder to be mixed with the aggregate shall conform to the provisions of Section 92,

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“Asphalt Binders,” of the State Specifications and shall be paving asphalt PG 64-10, unless otherwise directed by the Engineer.

The thickness of the HMA shall be eight (8) inches as shown on the Plans or as directed by the Engineer. HMA shall be placed in lifts conforming to Section 39-2.02C of the State Specifications (HMA with a total thickness of 8 inches shall be placed in 2.5 to 3-inch lifts). The HMA shall be placed and compacted to ninety-two to ninety-seven percent (92% to 97%) of theoretical maximum density and shall meet the elevation of the existing pavement contour. Areas inaccessible to rollers shall be compacted by use of a power compactor of the high impact, vibra-plate type, capable of attaining the same compaction as the rolled areas.

Pavement repairs shall be made using three equal lifts. Subsequent lifts of HMA shall not be placed until the underlying layer is 160°F or less, unless otherwise directed by the Engineer. Failure to meet these requirements shall be cause for rejection of the work.

The Contractor shall apply a tack coat to the vertical faces of the existing asphalt and to the base material prior to placement of HMA. Tack coat shall be SS-1h per Section 202-2, “Emulsified Asphalt,” of the Specifications.

The Contractor shall not perform pavement repair or skin patch operations when the weather is rainy, foggy or when the atmospheric temperature is below 50°F. It shall be the Contractor’s responsibility, based on weather predictions, to schedule pavement repair and skin patch operations to avoid placing HMA in the rain or fog. If the day’s operations are canceled because of predicted rain or fog, a non-working day will be allowed. HMA shall not be placed on any surface which contains ponded water or excessive moisture in the opinion of the Engineer. If paving operations are in progress and rain or fog forces a stoppage of work, loaded trucks in transit shall return to the plant and no compensation will be allowed for unused materials.

The Contractor shall furnish and use canvas tarpaulins to cover all loads of HMA from the time that the mixture is loaded until it is discharged from the delivery vehicle. Failure to cover HMA loads shall be grounds for rejection of the load.

Batch data and load slips shall be submitted to the Engineer as HMA is delivered to the project site to allow verification of materials and use. Failure to do so may result in non-payment for disputed loads.

All excavations for base repairs shall be backfilled to the existing pavement level in the same working period during which the excavation is performed, and prior to opening the full roadway to public traffic. Lane closures shall remain in full force until such time as the repair area has been finished to the existing pavement level.

If necessary, due to unforeseen occurrences, excavations shall be temporarily filled to the existing pavement level at the end of the working period, and subsequently re-excavated at the Contractor’s expense. Temporarily filled excavations shall have a minimum two-inch thick asphalt concrete surface or covered with a steel trench plate held in place with temporary HMA tapers not less than (10) inches long all along the plate edges on all sides.

The finished pavement surface shall be smooth and free of cracks, shoving, displacement,

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and segregation of coarse and fine materials. Paving shall be to a clean neat joint with existing grade. Paving with evidence of poor workmanship such as rock pockets, ripples, voids, segregation, or out of tolerance as determined by the Engineer or defined by these Special Provisions, may be removed.

Measurement and Payment

The contract unit price paid per **SQUARE FOOT** for ***Bid Item 19, Full Depth Base Repair (8-inch Depth)*** shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing asphalt concrete base repairs (dig outs), including cold-planing or grinding, sawcutting, excavating, loading, off-hauling, subgrade sampling and testing according to ASTM D1557 12e-1, compaction of in-situ subgrade materials (e.g. aggregate base, native soil), compaction testing according to ASTM D6938 17a, tack coat, and furnishing, placing, spreading, and compacting HMA (Type A, 3/4-inch maximum per Section 10-1.16, "Hot Mix Asphalt" of the Technical Provisions) to a depth equal to the thickness of the existing asphalt plus 1 inch, or eight (8) inches, whichever is greater.

10-1.10 PAVEMENT COLD PLANING/MILLING

Pavement planing (milling) shall precede paving operation by not more than three (3) working days. Milling of asphalt concrete pavement shall be performed without the use of a heating device to soften the pavement.

At curb ramps, milling shall transition from the landing to daylight in a straight line at least two (2)-feet from the far edge of the landing, or as approved by the Engineer.

Prior to milling, the Contractor is responsible for preparing either a radial point plan (RP plan), geolocating utility covers using GPS, or otherwise indicating utility locations such that the Contractor is aware of the locations of any utilities during all phases of work including, but not limited to, patching, excavation, and milling. Care shall be taken to protect existing (including newly poured) concrete throughout construction.

10-1.10A FULL WIDTH PAVEMENT MILLING

Cold milling and conform grinding of asphalt concrete pavement and concrete pavement shall conform to Section 42-3 of the State Specifications and as specified below.

Existing asphalt concrete pavement shall be cold milled at the locations and to the depth shown on the Plans and as directed by the Engineer. Pavement fabric may be encountered on this project at a depth of approximately one (1) to two (2) inches measured from road surface. Refer to pavement coring table included in the Plans for information on where pavement fabric may be encountered. Pavement fabric removed as part of the work becomes the property of the Contractor and shall be disposed according to local, state and federal regulations.

Milling shall include full milling through the curb return and into side streets as indicated on the Plans. The depth, length, width, and shape of the cut must be as shown on the Plans or as instructed by the Engineer. The final cut must result in a surface that is neat, textured, and uniform in appearance. Do not damage remaining surface.

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A drop-off of more than 0.15 foot is not allowed between adjoining lanes open to public traffic. If a drop-off between the existing pavement and the planed area at transverse joints cannot be avoided before opening to traffic, place W8-17 signs adjacent to the traveled way's outside edge. Place the first W8-17 sign where the vertical joint begins in the direction of travel on that lane. Place the W8-17 signs at 1,000-foot maximum intervals and at ramps and public roads entering the traffic lane. Compensation for signage associated with paving operations shall be included in the unit price for Bid Item 3, Traffic Control System.

Temporary asphalt tapers shall be provided where transverse joints are planed in the pavement at conform lines. No drop-off shall remain between the existing pavement and the planed area when the pavement is opened to public traffic. Asphalt concrete for temporary tapers shall be placed to the level of the existing pavement and tapered on a slope of 1:30 (Vertical:Horizontal) or flatter to the level of the planed area.

Asphalt concrete for temporary tapers shall be of commercial quality and may be spread and compacted by any method that will produce a smooth riding surface. Temporary asphalt concrete tapers shall be completely removed, including the removal of all loose material from the underlying surface, before placing the permanent surfacing. The removed material shall be disposed in accordance with local and state laws and regulations. Operations shall be scheduled so that not more than 10 days shall elapse between the time when transverse joints are planed in the pavement at the conform lines and the permanent surfacing is placed at the conform lines.

The final cut must result in a neat and uniform surface according to Section 39-3.04C(2) of the Caltrans Standard Specifications.

10-1.10B PAVEMENT PLANING EQUIPMENT

Cold planing machine must be equipped with a cutter head width that matches the planing width. If the only available cutter head width is wider than the cold plane area shown, submit to the Engineer a request for using a wider cutter head. Do not cold plane until the Engineer approves Contractor request.

Cold planing machine must be equipped with automatic controls to control the longitudinal grade and transverse slope of the cutter head. If a ski device is used, it must be at least 30 feet long, rigid, and a one (1) piece unit. The entire length must be used in activating the sensor. If referencing from existing pavement, the cold planing machine must be controlled by a self-contained grade reference system. The system must be used at or near the centerline of the roadway. On the adjacent pass with the cold planing machine, a joint matching shoe may be used.

Cold planing machine must be equipped to effectively control dust generated by the planing operation, must be operated so that no fumes or smoke is produced, and shall be maintained such that broken, missing, or worn machine teeth are replaced.

10-1.10C MILLINGS

Pick-up of material shall follow immediately behind the planing operation and shall be completed on the same workday.

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The streets shall be swept to clean up all loose material at the end of each workday, as well as Saturdays, Sundays, and holidays as ordered by the Engineer. Sweeping shall be limited to paved and concrete areas.

The Contractor shall deposit the millings at the Pittsburg Water Treatment Plant per Section 10-1.06 "Disposal of Waste Materials," a licensed disposal facility, or otherwise recycle them.

Measurement and Payment

Bid Items 20 and A1-3, Cold Milling Asphalt Pavement (3-inch Depth) shall be paid at contract price per **SQUARE YARD** and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in grinding asphalt concrete, including furnishing the asphalt concrete for and constructing, maintaining, removing, and disposing of temporary asphalt concrete tapers, complete in place as specified in these Special Provisions, as shown on the Plans and as directed by the Engineer and no additional compensation will be allowed therefor.

10-1.11 REMOVE PAVEMENT SURFACING

This work consists of removing the existing pavement surface, aggregate base and/or subgrade to prepare and make space for the construction of the new structural pavement section as indicated on the Plans. Milling or other approved methods may be used. If milling is chosen, the milling operations shall consider that adjacent trees and limbs shall be protected unless identified for removal.

Removal of surfacing, base, and subgrade shall conform to the provisions in Section 19-2, "Roadway Excavation," of the State Specifications and the following requirements:

1. At the project limits, existing pavement shall be sawcut in a neat line to its full depth. The existing pavement, including underlying aggregate base and/or subgrade materials, shall be removed to allow for the placement of the proposed pavement section as shown on the Plans
2. Removed asphalt millings shall be disposed of at a licensed disposal facility or the Pittsburg Water Treatment Plant or recycled. Asphalt millings that are mingled with aggregate base or subgrade soil shall become the property of the Contractor and shall be disposed of at a legal dumpsite or recycled.
3. All concrete, soft or spongy, or deleterious materials, structures and other unsuitable material encountered during the excavation operation (whether shown or not shown on the Plans) shall be removed and disposed of. No additional compensation will be allowed for any work which may be necessary to remove and dispose of deleterious materials or structures within the grading plane as shown on the Plans. For compensation related to unsuitable subgrade materials refer to Section 10-1.14.
4. When the planned excavation of subgrade is made, all undesirable material then encountered will be removed and disposed of as directed by the Engineer. Quantities of removed, unsuitable material (including the material used as replacement) shall be paid for as provided for in these Technical Specifications.
5. The accumulation of water in excavated areas shall be prevented by means of pumping or other approved methods. At no time will ground water or storm water be allowed to flow down sanitary sewer or storm drain lines.

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6. Excavation shall be carried to the depth indicated on the Plans or as specified. Should the Contractor, through his negligence or other fault, excavate below the designated lines, he/she shall replace such excavations with approved materials at his own expense.
7. Asphalt concrete milling, if chosen by the Contractor to remove existing asphalt pavement shall be performed by cold milling methods. Methods utilizing the application of heat to the pavement will not be permitted. If cold milling is used, the cold milling machine shall:
 - a. Size of the milling machine shall be chosen to fit the locations and not to negatively impact adjacent trees, canopy and roots.
 - b. Rotate in such a manner as to deposit milled material neatly behind the cutting chamber and clear of the wheel tracks.
 - c. Be operated so as not to produce dust, fumes, or smoke.
 - d. Have the cutting chamber enclosed and shrouded and equipped with an operating pressure fog spray system.
 - e. Be equipped with operating automatic depth and slope controls on the cutter assembly which are independent of the main frame suspension.
8. Contractor shall field verify locations and elevations. of existing underground utilities and to immediately notify the Engineer of any conflicts with the proposed pavement rehabilitation method. Contractor shall conduct potholing of utilities to confirm that they do not pose a conflict with the proposed excavation work and can be protected during construction. Coordinate with utility companies regarding acceptable depth of cover.

Measurement and Payment

Bid Item 21, Remove Surfacing and Base (8-inch Depth) shall be paid at contract price per **CUBIC YARD**. Measurement will be based on the actual number of cubic yards of pavement removed as determined by length, width, and depth measurements.

The contract unit price paid per square foot of "Remove Surfacing and Base (8-inch Depth)" shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all work involved in the removal of existing Asphalt Concrete and base materials, including disposal, complete and in place, all as indicated on the plans, specified in the Standard Specifications, these special provisions, and as directed by the Engineer, and no additional compensation will be allowed.

10-1.12 AGGREGATE BASE

Class 2 Aggregate Base shall conform to the 3/4-inch maximum grading and quality requirements as specified in Section 26, "Aggregate Bases," of the State Specifications.

Four (4) inches of aggregate base shall be placed under new concrete curb, gutter, sidewalk, curb ramps, and light driveways. Aggregate base shall be spread in accordance with the provisions of Section 26-1.03C, "Spreading," and Section 26-1.03D, "Compaction," of the State Specifications. Spreading and compacting shall be performed by methods that will produce a uniform base, firmly compacted and free from pockets of coarse or fine material. No spreading operation shall begin until the physical characteristics of aggregate base have been approved by the Engineer. Aggregate base exceeding a workable moisture content will be rejected by the City and shall be immediately removed from the project site by the Contractor.

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Aggregate base, regardless of its use, shall be compacted to ninety-five percent (95%) relative compaction. The subgrade shall be graded to the prism of the finished grade and shall be moisture conditioned and compacted to ninety-five percent (95%) relative compaction. The Contractor shall take soil samples and provide soil testing to determine maximum dry density and optimum moisture content of the subgrade.

Measurement and Payment

Full compensation for complying with Section 10-1.12 shall be considered as included in the contract prices paid for in the related item and no separate payment will be made therefor.

10-1.13 SUBGRADE PREPARATION

Subgrade preparation associated with surface reconstruction shall follow removal of surfacing and base to the depth specified and shall include all grading, additional excavation and fill as necessary to grade the subgrade to the lines and grades required to achieve pavement finish grades, moisture conditioning of subgrade materials (in-situ or fill), compaction to the maximum dry density including quality control testing, and/or backfill of low spots, and proof rolling.

Subgrade and or base materials of surface reconstruction street sections shall be compacted with roller type equipment to achieve a firm and non-yielding pavement surface that is suitable to be paved. Care should be taken by the Contractor to not over-compact subgrade and/or base materials that result in pumping and yielding of subgrade and/or base materials. The City and/or approved representative will approve the subgrade prior to paving operations. To approve the subgrade, it shall be proof rolled by the Contractor with a fully loaded water truck or similar in the presence of a City representative. Areas that pump or yield under truck tire loading will be delineated in the field with marking paint as unsuitable material and then over-excavated as described in Section 10-1.15 "Subgrade Over-Excavation". HMA paving that occurs on streets where the subgrade has not been approved by the City shall be removed at no cost to the City. The Contractor shall notify the City a minimum of 48 hours prior to subgrade proof rolling. The maximum time allowed between exposing subgrade after removal of surfacing and base and placement of the first HMA lift shall be three (3) days.

Subgrade preparation for new concrete flatwork, curbs, curb and gutters, or curb ramps and the like shall be included in the related item.

Excavation and removal of various existing items which are in conflict with the work (including concrete ramps, sidewalk, curbs and gutters, asphalt and/or concrete pavement and other obstructions encountered during excavation) shall be considered as included under various applicable sections of these Technical Specifications.

Materials including failed street areas, pavement fabric, tree roots, sub grade, or base material which are removed from the worksite to accommodate the installation of new facilities shall become the property of the Contractor and shall be disposed of outside the road right-of-way at a legal dumpsite. Disposal shall be performed on the same day that waste material is generated.

The subgrade for surface reconstruction shall be prepared to achieve in general a 2% cross

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slope (or as shown on the plans) of the finish grade of the full depth AC pavement. The Contractor shall identify the required lines, levels, and contours and flag locations of known utilities. Grading shall be done to the required lines and grades to achieve the specified cross slope and to tie the new pavement to the existing improvements to remain.

Contractor to provide laboratory compaction curve results of subgrade materials and provide compaction testing. Subgrade shall be compacted to 95% relative compaction and compaction results shall be submitted to the Engineer. Subgrade areas that do not meet the compaction requirements shall be reworked and re-tested until the compaction requirement is met at no cost to the owner.

Measurement and Payment

Bid Item 22 and A1-4, Subgrade Preparation shall be paid at the contract price per **SQUARE YARD** and includes all labor, materials, tools, equipment, and incidentals necessary to prepare the subgrade or aggregate base on surface reconstruction streets prior to the placement of asphalt pavement, including, but not limited to, grading, moisture conditioning, compaction, and geotechnical sampling and laboratory compaction testing to determine the relative compaction of the subgrade soil, and quality control compaction testing.

10-1.14 SUBGRADE OVER-EXCAVATION

If the Contractor is unable to achieve the specified compaction below pavement base repair or concrete construction areas, the material shall be deemed as unsuitable material and the Contractor shall notify the Engineer. The Engineer will make a determination as to whether over-excavation is necessary.

When encountered during construction of base repair or concrete construction, unsuitable material shall be over-excavated to a depth of six (6) to twelve (12) inches and replaced with Class 2 Aggregate Base conforming to Section 10-17, "Aggregate Base," of these Technical Provisions. Prior to replacing the void with aggregate base, the Contractor shall moisture condition and compact the new sub-grade to ninety-five percent (95%) relative compaction and subsequently install a geogrid (i.e. Tensar BX 1200 or approved equivalent). One (1) compaction curve of subgrade material shall be developed for each street section. The aggregate base shall then be moisture conditioned, placed in lifts not to exceed six (6) inches and compacted to ninety-five percent (95%) relative compaction.

Over-excavation of unsuitable material may consist of AC, base material and native material. The material to be excavated may contain reinforcing fabric and/or other typical constituents of AC by-products and/or any other naturally occurred deleterious substances encountered with roadway construction. The City makes no guarantee that the material excavated will be reusable, recyclable or disposable to any disposal site designated by the Contractor. No additional compensation shall be allowed to the Contractor if the over-excavated material is not reusable, recyclable, or is required to be disposed of at a Class II disposal facility. Any testing, if required by the disposal site, shall be arranged and paid for by the Contractor.

Measurement and Payment

The contract unit price paid per **SQUARE YARD** for ***Bid Item 23 and A1-5, Subgrade Over-Excavation (Revocable Bid Item)*** shall include full compensation for furnishing all labor,

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materials, tools, equipment and incidentals, and for doing all the work involved in subgrade over-excavation, including soil sampling (testing and analysis required for disposal at a licensed disposal facility), excavation and disposal of soil unsuitable to establish a compacted subgrade as specified, furnishing, transportation, and placement of aggregate base, moisture conditioning, compaction, and testing to determine the relative compaction of the subgrade soil and aggregate base according to ASTM D6938 17a. Unit price shall be based on excavating and backfilling of an additional 9-inch deep section after initial excavation to be compacted and backfilled with aggregate base.

For estimating purposes the quantity for subgrade over-excavation listed in the bid schedule assumes that twenty-five percent (25%) of the total base repair areas and ten percent (10%) of the total subgrade preparation areas will require over-excavation. The provisions of Section 9-1.06 of the Caltrans Standard Specifications shall not apply to this item of work. Rather, the unit price for "Subgrade Over-Excavation (Revocable Item)" entered by the Contractor in the Bid Schedule shall govern regardless of the final quantity of over-excavation performed. Further, an increase or decrease of more than twenty-five percent (25%) of the estimated quantity of unsuitable soil removal shall not constitute a change in the character of the work.

10-1.15 COLD CENTRAL PLANT RECYCLING OF RECLAIMED ASPHALT PAVEMENT (FOAMED ASPHALT OR ENGINEERED EMULSION)**10-1.15A COLD CENTRAL PLANT RECYCLING OF RECLAIMED ASPHALT PAVEMENT USING FOAMED ASPHALT****1. DESCRIPTION**

1.1 Scope - This work shall consist of Cold Central Plant Recycling (CCPR) of Reclaimed Asphalt Pavement (RAP) removed from the pavement sections identified on the plans and within the project limits or as provided and approved by the Engineer. RAP cannot be taken off-site to any other production facility or alternate plant location. All RAP milled from project locations must be used for recycled CCPR paving operations and must be utilized in mix design. The RAP shall be stock-piled in the designated area as shown on the plans or in an area provided by the Contractor and approved by the Engineer. The RAP shall be clean and free of contamination by dirt, base, paving fabric, concrete or other deleterious materials. The stockpiled RAP shall be screened, and material retained on the 1" screen shall be crushed to a graded aggregate blend with 100% of the crushed RAP passing a 1-inch sieve.

The properly graded RAP to be recycled shall then be blended with foamed asphalt and other additives, as required by the Contractor's mix design or as directed by the Engineer, to produce a recycled asphalt concrete meeting the performance requirements of these special provisions. This material shall then be placed and compacted in accordance with the project plans and these special provisions, and as directed by the Engineer.

Submittals - At the time of bid, the Contractor shall furnish the following information regarding the Cold Central Plant Recycling (CCPR) to the Engineer. Approval of the Contractor or Subcontractor performing the CCPR is at the discretion of the Engineer.

- 1) Asphalt cement and Type II cement for foaming process. Identification that the proposed recycling constituents have been successfully used on at least five (5) other CCPR asphalt projects in California over the past three (3) years, including project name,

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agency/owner, project engineer, and construction dates.

- 2) Description and specification of the proposed CCPR recycling unit and support equipment, construction methods.
- 3) The Contractor (or Subcontractor) shall have completed a minimum of five (5) CCPR asphalt projects in the last three (3) years. Submit project name, agency/owner, project engineer, and construction dates.
- 4) The CCPR recycling unit shall demonstrate the ability to crush and screen the RAP used in the CCPR process and remove pavement reinforcing fabric during the recycling process.
- 5) Verification the CCPR recycling unit meets the proportioning requirements of California Test 109 and the applicable Air Quality Control district permits.
- 6) Quality Control Plan.

1.2 Foamed Asphalt Mix Design – Contractor shall submit a cold in-place recycled asphalt concrete mix design to the Engineer at least 20 days prior to beginning recycling operations. Mix designs shall be performed by the Contractor using representative RAP samples from the project or approved RAP stockpile. The mix design shall be performed by an AASHTO accredited laboratory. The mix design shall determine the rate of foamed asphalt, cement, and water to be added to the reclaimed asphalt pavement in order to produce a cold recycled asphalt concrete mixture. Based on the characteristics of the reclaimed asphalt pavement taken from the project site, more than one mix design may be required. The mix design shall conform to the quality requirements of Table 1.

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Table 1 – Cold Central Plant Recycling Mix Design Requirements

CIR Mixture Design Requirements	Requirement
Gradation of Reclaimed Asphalt Pavement (RAP): CT 202	1-inch maximum
Asphalt Content of RAP: ASTM D 2172 Method B	Report
Bulk Specific Gravity of Compacted Samples ^{a, b} : AASHTO T245	Report
Maximum Theoretical Specific Gravity ^b : AASHTO T209	Report
Air Voids of Compacted and Cured Specimens ^b : AASHTO T269	Report
Indirect Wet Tensile Strength, Cured Specimen ^d : CT 371, Section J	30
Indirect Dry Tensile Strength, Cured Specimen ^d : CT 371, Section J	Report
Tensile Strength Ratio (%): CT 371	Report
Ratio of Bituminous Residue to Cement (min)	2.5

^a 4-inch diameter mold compaction based on either 75 blow Marshall on each side or gyratory compactor at 30 gyrations.

^b Test specimens after 140°F curing to constant weight between 16 hours and 48 hours.

^c Vacuum saturation from 55 percent to 75 percent. Water bath at 77 °F for 23 hours, with the last 30 minutes to 40 minutes in 104°F water bath.

^d Fabricate 6 indirect tensile strength specimens under AASHTO T245. Fabrication of indirect tensile strength specimens must be completed within 30 minutes after materials have been mixed. Cure the specimens at 104°F for 72 hours and allow the specimens to cool to room temperature. Test 3 specimens for dry tensile strength under California Test 371. Test 3 specimens for wet tensile strength under California Test 371 after moisture conditioning.

The mix design report shall include gradation of dry RAP, recommended water content range as a percentage of dry RAP; optimum foamed asphalt content as a percentage of dry RAP; amount of additive(s) as a percentage of dry RAP; and corresponding density, air void level, absorbed water, Indirect Tensile Strength (Dry), Indirect Tensile Strength (Wet), and Tensile Strength Ratio at recommended moisture, cement, and added asphalt contents. For the foamed asphalt agent and additives, include the designation, company name, location, paving grade designation of the asphalt, and certificates of compliance.

Asphalt used for the mix design and in the cold foam recycling process shall conform to the provisions in Section 92, "Asphalts," of the Standard Specifications, 2015 Edition published by the California Department of Transportation. The grade of asphalt shall be PG 64-10. The asphalt shall not be heated above a temperature of 190°C. Asphalt provided shall have no additives or properties which will inhibit the ability of the foaming machine to produce asphalt foam with a minimum expansion ratio (volume of foamed asphalt to residual, un-foamed asphalt) of 8, and a half life (time for the foamed asphalt to lose half its expanded volume) of not less than 6 seconds.

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Cementitious material included in the Mix Design shall be a Type II Portland Cement.

Water may be added to facilitate the uniform mixing of the recycling agent and the processed RAP. Water added to the recycled asphalt concrete section shall be clean and free from deleterious concentrations of acids, alkalis, salts, sugar and other organic or chemical substances. The water shall not contain an amount of impurities that will cause a reduction in the strength of the recycled asphalt concrete. Water used specifically in the foaming apparatus for foaming the asphalt shall be free of impurities so that upon evaporation no deposits or residue are left behind that might clog or impede water flow to the foaming nozzles of the recycle machine.

1.3 Just-in-Time Training – Attending a 2-hour minimum Just-In-Time Training (JITT) shall be mandatory and consist of a formal joint training class on CCPR materials, equipment, placement, and quality control. Construction operations for CCPR materials shall not begin until the Contractor's and the Engineer's personnel have completed the mandatory JITT. The Contractor's personnel involved in the CCPR pavement mix design and quality control, as well as equipment operators and crew involved in the CCPR mixing and paving operation, and the Engineer's representatives including inspectors and testers, shall attend JITT. The JITT class will be conducted for not less than two (2) hours on CCPR operations and CCPR paving best practices. The training class shall be conducted at a project field location convenient for both the Contractor and the Engineer. The JITT class shall be completed not more than five (5) days, not including Saturdays, Sundays or holidays, prior to the start of the CCPR operation. The class shall be held during normal working hours. The JITT instructor shall be provided by the Contractor. The instructor shall be experienced in the construction methods, materials, and test methods associated with construction of CCPR pavement projects. A copy of the course syllabus, handouts, and presentation material shall be submitted to the Engineer at least seven (7) days before the day of the training. The Contractor and the Engineer shall mutually agree to the course instructor, course content, and training site. Just-In-Time Training shall not relieve the Contractor of responsibility under the contract for the successful completion of the work in conformance with the requirements of the plans and specifications.

MATERIALS

1.3 Asphalt Foaming Recycling Agent – Paving asphalt used in the cold foam in-place recycling process shall conform to the provisions in Section 92, "Asphalts," of the Standard Specifications. The grade of asphalt shall be PG 64-10, or as specified by the Engineer. The asphalt shall not be heated above a temperature of 190 deg. C. Asphalt provided to the job shall have no additives or properties which will inhibit the ability of the foaming machine to produce asphalt foam with a minimum expansion ratio (volume of foamed asphalt to residual, un-foamed asphalt) of 8, and a half-life (time for the foamed asphalt to lose half its expanded volume) of not less than 6 seconds.

A 1-gallon sample asphalt shall be obtained from each delivery vehicle to the job and turned over to the Engineer at the end of the day or retained by the Contractor at the direction of the Engineer. The sample shall be sealed and the container clean and dry when the sample is taken. The sample bottle shall be marked with the date and time the sample was taken, the name of the supplier, and the bill of lading number from the load delivery ticket.

The Contractor shall provide current test results and a Certificate of Compliance for the

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paving grade asphalt and any additives at the time of mix design. A Certificate of Compliance shall also be provided for each load delivered to the jobsite.

1.4 Cementitious Materials – As determined by the Mix Design, Cementitious material shall be a Type II Portland Cement.

Water – Water may be added to facilitate the uniform mixing of the foamed asphalt recycling agent or the emulsified asphalt recycling agent and the processed RAP. Water added to the recycled asphalt concrete section shall be clean and free from deleterious concentrations of acids, alkalis, salts, sugar and other organic or chemical substances. The water shall not contain an amount of impurities that will cause a reduction in the strength of the recycled asphalt concrete pavement. If the water is of questionable quality, it shall be tested in accordance with AASHTO T26.

The water shall not contain an amount of impurities that will cause a reduction in the strength of the stabilized base material. Water used specifically in the COLD FOAM apparatus for foaming the asphalt shall be purified so that upon evaporation no deposits or residue are left behind that might clog or impede water flow to the foaming nozzles of the recycle machine.

Crushed Reclaimed Asphalt Pavement (RAP) – The stockpiled RAP shall be crushed and screened as necessary to conform to the following gradation prior to the addition of the emulsified recycling agent:

Sieve Size	Percentage Passing
1-Inch	100

Rubberized crack filler, pavement markers, loop wires, thermoplastic markers, fabric and other like materials that may be incorporated into the RAP as it is removed from the roadway shall be removed by the screening process. A minor amount of these residual materials that cannot be completely removed from the processed RAP may be incorporated into the recycled mix if the Contractor can demonstrate that those added materials will not adversely affect the performance of the recycled asphalt pavement. Any such materials retained in the mix shall be appropriately sized and blended so as not to adversely affect the appearance or strength of the recycled pavement.

Crushed and screened RAP shall not be stockpiled for longer than 10 days or in stockpiles greater than 20 feet in height that may, through the weight of the stockpile, reconsolidate the crushed and screened RAP. Water shall be added to the RAP as it is screened and crushed to abate dust and mitigate reconsolidation.

2. Construction Methods

Weather Limitations - Recycling and placement operations shall not be performed when the atmospheric temperature is below 50°F or when rain is falling or imminent, or when the Engineer deems weather conditions are such that proper mixing, spreading, compacting and curing of the recycled pavement cannot be properly accomplished. In the event CCPR

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pavement is placed and weather conditions deteriorate soon after, it is then a requirement that all traffic stay off the recycled mat until weather conditions improve (temperature rises and humidity drops) and the recycled section has been compacted and fog-sealed in accordance with these Special Provisions. All CCPR mixing and paving operations shall be completed a minimum of 2 hours before sunset to allow for compaction and protection operations.

2.1 Mixing and Proportioning — The recycled material shall be processed through a material sizing unit having screening and crushing capabilities to reduce the RAP to the maximum size of 1-inch prior to mixing with the foamed asphalt and any other additives specified in the mix design. After crushing and sizing, the recycled material shall be processed in a mixing unit capable of processing the sized RAP, introducing the foamed asphalt, water and any cementitious additives to a homogeneous mixture to produce recycled asphalt concrete. The mixing unit shall be equipped with a means of determining the continuing mass of the RAP as it is processed and a coupled/interlocked computer-controlled liquid metering device to control the foamed asphalt. The mixing unit shall be an on-board completely self-contained counter rotating twin shaft pugmill. The liquid metering device shall be capable of automatically adjusting the flow of foamed asphalt to compensate for any variation in the weight of the RAP introduced into the pugmill. Foamed asphalt shall be metered by weight of RAP using a mass flow, Coriolis effect, type meter that will accurately measure the amount of recycling asphalt to within +/- 0.5 percent of the amount required by the mix design or as adjusted in the field. Other additives, including water as required, shall be controlled using the weight of the RAP introduced into the pugmill. Additives may only be introduced by weight per the mix design – no volumetric metering shall be allowed.

The CCPR Contractor shall calibrate and the Engineer shall verify the accuracy of the recycle plant not less than five days before recycling operations are to begin, but not before the recycle plant has been delivered and set up on the project site. Automatic digital readings shall be displayed for both the flow rate and total amount of RAP, asphalt added, and additives in appropriate units of weight and time. The asphalt, additives and water shall be incorporated into the graded RAP at the initial rate determined by the mix design and approved by the Engineer. The total water content will include that amount present in the stockpile and additional water at the pugmill if required. Adjustments in the rate of recycling asphalt, additives and water will be determined by the Qualified Technician and made as necessary based on the field observed changes in the RAP and/or condition of the recycled mat. Sampling variations and mix design may determine the necessity of different levels of foamed asphalt and/or cementitious additives in various sections of the project.

When a paving fabric is encountered during the RAP processing operation, the CCPR Contractor shall make the necessary changes in equipment or operations so that incorporation of the shredded fabric in the recycled material does not affect the performance parameters of the recycled asphalt concrete or inhibit placing or compaction of the CCPR pavement. No fabric piece incorporated into the recycled section shall have any dimension exceeding a length of 2 inches. Excessive fabric that might compromise the strength or stability of the recycled asphalt concrete shall be removed and properly disposed of by the Contractor as directed by the Engineer.

2.2 Subgrade and Surface Preparation - If the recycled pavement is to be placed on an

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existing milled pavement surface it shall be verified that the milled surface is firm and unyielding and there are no subgrade failure areas beneath the milled surface that might compromise the integrity of the recycled pavement. Base repairs will be performed as specified in plans. When CCPR pavement is placed on a milled surface or adjacent to structures such as curbs, concrete gutters, swales, planters, etc., these contact surfaces shall be swept of all loose material to create a dry clean surface. A tack coat of SS-1H emulsion or equivalent (0.05 gallon per square yard minimum) shall be applied to all surface areas prior to placing the recycled pavement. When CCPR is placed on a compacted base or cement treated base/subgrade, a tack coat or prime coat may be required at the discretion of the Engineer. CCPR pavement is not recommended as a direct overlay on existing asphalt pavement without first milling the underlying pavement to aid in bonding and to prevent slippage. Successive layers of recycled pavement may be paved without milling but requires that each layer be fully cured and compacted before placing the overlay section. See "Placement" in this specification.

2.3 Transportation – Trucks with smooth clean beds shall be used to haul the recycled asphalt concrete to the placement area. The loaded trucks shall deliver the blended material into the paver or material must be placed in the paver hopper by a pickup machine within 1 hour of mixing.

2.4 Placement - Recycled pavement shall be spread using a self-propelled paver having electronic grade and cross slope control for the screed. The equipment shall be of sufficient size and power (minimum 170 hp) to spread the recycled material in one continuous pass, without segregation, to the lines and grades established by the Engineer and according to Plans. Heating of the paver screed is not permitted.

CCPR pavement shall be placed to the finished thickness as specified by the Engineer and plans. A single lift thickness shall be at a minimum compacted depth of 2-inches and not exceed a maximum compacted depth of 4.5-inches. Before placing any additional lifts, the recycled surface shall be allowed to cure until the moisture of the material is reduced to 2.0 percent or less and upon the Engineer's approval. Compaction of the first layer and any subsequent layers to be overlaid shall be performed and verified per the Compaction and Cure and Maintenance requirements of this specification. Prior to installing any additional lifts, contact surfaces shall be carefully swept of all loose material to create a dry clean surface. A tack coat of SS-1h emulsion or equivalent (0.05 gallon per square yard minimum) shall be applied to all surface areas prior to placing any additional lifts.

When a pick-up machine is used for transferring the recycled material from a windrow to the receiving hopper of the paver, the pick-up machine shall be capable of removing and transferring the entire windrow of recycled mix in a single pass.

Handwork of CCPR pavement shall be minimized and care shall be taken to prevent segregation. The wings of the paver shall be emptied regularly to prevent buildup and to minimize segregation.

2.5 Compaction – The compaction of the recycled mix shall be completed using self-propelled rollers, complete with properly operating scrapers and water spray systems. The number, weight and types of rollers shall be as necessary to obtain the required compaction. At a minimum the following rollers shall be used:

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- At least one pneumatic roller with a minimum gross operating weight of not less than 25 tons; tires on the pneumatic rollers shall be evenly inflated and matched in size and profile to maximize compaction effort.
- At least one double drum steel vibratory roller with a gross operating weight of not less than 10 tons with a minimum drum width of at least 60-inches.

Rolling patterns shall be established in the field by the Contractor and verified by the Engineer to achieve a maximum density determined by nuclear density testing. A rolling pattern for compaction shall be determined such that no increase in density is shown on successive nuclear density tests (per ASTM D 2950) for any additional passes of the compaction equipment once the maximum density pattern has been identified ("break over point"). Nuclear density testing shall be repeated throughout the time compaction is being completed to continuously verify the compaction is achieving maximum density results by establishing a rolling vs. density chart that shows the progress of densification from initial breakdown compaction through maximum obtainable density at the break over point.

Care shall be taken not to over compact the mat. The Qualified Technician shall be on site and observing all compaction efforts, monitoring density gauge readings, and approving areas as they reach maximum density. The minimum rolling pattern shall be as follows:

- Two complete coverages with the double drum steel vibratory roller immediately after the recycled mix is placed. The first coverage shall be made without the vibratory unit turned on and the second with the vibratory unit operating.
- Two complete coverages with the pneumatic-tired roller shall be made after the initial passes of the steel roller.
- Final rolling, before cure, to eliminate pneumatic tire marks and to achieve maximum density shall be done by the double drum steel roller, either operating in a static or vibratory mode.

The recycled mat shall be continuously observed during compaction efforts. If moisture cracking occurs under the vibratory compaction mode, the vibrators shall be turned off and static rolling only applied. If moisture cracking of the mat continues under static steel rolling, steel drum compaction shall cease, the mat shall be allowed to cure for a time in order for some moisture to escape, and pneumatic rolling commenced, followed by steel rolling to iron out irregularities from the rubber-tired roller(s). This procedure is to be followed until there is no longer any displacement of the mat observed by roller action on the recycled surface.

The selected rolling pattern shall be followed unless changes in the recycled mix or placement conditions occur and a new rolling pattern is established at that time. Any type of rolling that causes cracking, major displacement, and/or any other type of pavement distress shall be discontinued until such time as the problem can be resolved. Discontinuation and commencement of rolling operations shall be at the discretion of the Engineer.

Extra care shall be taken to ensure that aggregate from the recycled mixture does not stick to the drums or wheels of the rollers. Water shall be uniformly applied to the wheels and drums, along with mechanical means to keep aggregate from sticking. Sufficient water shall be applied to keep rollers and tires clean, but not so much that water pools or ponds on the

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recycled surface.

Rollers shall not be started or stopped on un-compacted recycled material. Rolling patterns shall be established so that starting and stopping will be on previously compacted material or the adjacent, existing surfacing.

3.7 Cure and Maintenance — After the completion of compaction of the recycled material, no traffic, including that of the Contractor, shall be permitted on the recycled material for at least two hours. This may be reduced if sufficient care is established for traffic that will not initiate raveling. A fog seal of dilute (1:1) SS-1H, CSS-1H emulsion or equivalent (0.15 to 0.25 gallon per square yard) shall be applied after initial compaction, to all areas opened to traffic prior to placement of overlay. If necessary to prevent pickup of the fog seal, the recycled pavement surface shall be covered with sand at a rate of 1.0 to 2.0 pounds per square yard. Excess sand shall be removed from the pavement surface by careful sweeping. Sand shall be free from clay or organic material. Fog sealing and/or sanding shall be initiated at the Engineer's direction.

After opening to traffic, the surface of the recycled pavement shall be maintained in a condition suitable for the safe movement of traffic. Before placing the final surfacing, the recycled surface shall remain in-place:

- For a minimum of 1 day and until there is less than 2.0 percent moisture remaining in the recycled pavement mixture; or
- A minimum of 10 days without rainfall.

3.8 Smoothness - The finished surface and grade of the recycled material shall be checked regularly during placement using a level. The smoothness shall not vary more than 1/4 inch from a 10-foot straight edge placed on the surface. The Contractor shall correct humps or depressions exceeding this tolerance. High points may be trimmed if approved by the Engineer in the field.

3. Acceptance Testing

3.1 Gradation - A sample shall be obtained from the pugmill for each 500 tons of RAP to verify the maximum particle size requirement is being met. The first sample and every third sample thereafter shall be compared to the gradation band determined during the mix design by performing a wet field gradation for material passing the 1-inch to No. 4 sieves. The CCPR Contractor shall adjust the recycling agent as needed.

3.2 Paving Grade Asphalt - A Certificate of Compliance from the asphalt manufacturer or the asphalt emulsion manufacturer, as applicable, shall accompany each shipment to the Project. The CCPR Contractor shall retain minimum 1-gallon samples of from each load of asphalt delivered to the project.

3.3 Asphalt Content - Asphalt content shall be checked and recorded for each segment (lot). Asphalt content changes shall be made based upon identified parameters in the mix design and the stability of the CCPR pavement. Asphalt content shall be checked from the liquid binder meter totalizer and verified by the delivery weight tickets.

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3.4 Cementitious Additives - A Certificate of Compliance from the cement manufacturer shall accompany each shipment to the Project.

3.5 Cementitious Additive Content - Cement content shall be checked and recorded for each segment in which the additive is used per the mix design. Cement added shall be checked from the belt scale totalizer and verified by the delivery weight tickets.

3.6 Recycled Material Compacted Density - Wet density shall be determined using a nuclear moisture-density gauge generally following the procedures for ASTM D 2950, backscatter measurement. A rolling pattern will be established such that a maximum density is achieved with the rollers specified, based on relative nuclear density readings.

4. Method of Measurement

Placement of the recycled asphalt concrete pavement shall be measured by the square yards completed and accepted by the Engineer. Asphalt and additive weights shall be based upon certified delivery weight tickets less any unused portion. Water used in this operation will not be paid for directly and shall be considered subsidiary to the bid item.

5. Methods of Payment

The contract price paid per ton for cold recycled asphalt shall include full compensation for all labor, materials, tools, equipment, and incidentals; for doing all the work involved in cold central plant recycling, complete in-place; for mixing, blending, hauling, placing, and compacting the recycled pavement mixture; for protection and maintenance of the recycled layer; for performing all QC testing including mix design; for fog sealing, sanding and sweeping if necessary; for obtaining measurements and recording results of all tests as shown on the plans and as directed by the Engineer.

Payment for the asphalt used shall be made at the Contract bid unit price per ton. The price shall be compensation for furnishing materials, equipment, labor, tools and incidentals necessary to provide material. No adjustment will be made in the unit price for an increase or decrease in contract units.

No direct payment will be made for mix design, Quality Assurance/Quality Control, cement, fog seal or sand.

10-1.15B COLD CENTRAL PLANT RECYCLING OF RECLAIMED ASPHALT PAVEMENT USING ENGINEERED EMULSION

DESCRIPTION

Scope - This work shall consist of Cold Central Plant Recycling (CCPR) of Reclaimed Asphalt Pavement (RAP) milled from roadways within the project limits and stockpiled in the vicinity of the Project. RAP cannot be taken off-site to any other production facility or alternate plant location. All RAP milled from project locations must be used for recycled CCPR paving operations and must be utilized in mix design. The RAP shall be clean, free of contamination of dirt, base, concrete or other deleterious materials. The stockpiled RAP shall be crushed

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and screened to 100% of the crushed RAP passing a 1-inch sieve. The properly graded RAP to be recycled shall then be blended with an emulsified asphalt recycling agent and cement additive, as required by the CCPR Contractor's Mix Design, to produce a recycled asphalt concrete. This material shall then be placed and compacted in accordance with the Plans and Specifications, and as directed by the Engineer.

Submittals - At the time of bid, the Contractor shall furnish the following information regarding the Cold Central Plant Recycling (CCPR) to the Engineer. Approval of the Contractor or Subcontractor performing the CCPR is at the discretion of the Engineer.

- 1) Emulsion and emulsion supplier. Identification that the proposed recycling emulsion has been successfully used on at least five (5) other CCPR asphalt projects in California over the past three (3) years, including project name, agency/owner, project engineer, and construction dates.
- 2) Description and specification of the proposed CCPR recycling unit and support equipment, construction methods.
- 3) The Contractor (or Subcontractor) shall have completed a minimum of five (5) CCPR asphalt projects in the last three (3) years. Submit project name, agency/owner, project engineer, and construction dates.
- 4) The CCPR recycling unit shall demonstrate the ability to crush and screen the RAP used in the CCPR process and remove pavement reinforcing fabric during the recycling process.
- 5) Verification the CCPR recycling unit meets the proportioning requirements of California Test 109 and the applicable Air Quality Control district permits.
- 6) Quality Control Plan.

Just-in-Time Training – Attending a 2-hour minimum Just-In-Time Training (JITT) shall be mandatory and consist of a formal joint training class on CCPR materials, equipment, placement, and quality control. Construction operations for CCPR materials shall not begin until the Contractor's and the Engineer's personnel have completed the mandatory JITT. The Contractor's personnel involved in the CCPR pavement mix design and quality control, as well as equipment operators and crew involved in the CCPR mixing and paving operation, and the Engineer's representatives including inspectors and testers, shall attend JITT. The JITT class will be conducted for not less than two (2) hours on CCPR operations and CCPR paving best practices. The training class shall be conducted at a project field location convenient for both the Contractor and the Engineer. The JITT class shall be completed not more than five (5) days, not including Saturdays, Sundays or holidays, prior to the start of the CCPR operation. The class shall be held during normal working hours. The JITT instructor shall be provided by the Contractor. The instructor shall be experienced in the construction methods, materials, and test methods associated with construction of CCPR pavement projects. A copy of the course syllabus, handouts, and presentation material shall be submitted to the Engineer at least seven (7) days before the day of the training. The Contractor and the Engineer shall mutually agree to the course instructor, course content, and training site. Just-In-Time Training shall not relieve the Contractor of responsibility under the contract for the successful completion of the work in conformance with the requirements of the plans and specifications.

Mix Design – A mix design shall be submitted by the CCPR Contractor using representative samples of the asphalt concrete to be recycled obtained directly from the Project site. The mix design shall be certified by a licensed Civil Engineer experienced in cold recycled

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pavements. The job mix formula shall meet the criteria of Table 1 and be approved by the Engineer.

Table 1

CIR Mixture Design Requirements	Requirement
Gradation of Reclaimed Asphalt Pavement (RAP): CT 202	1-inch maximum
Asphalt Content of RAP: CT 362 or CT 379 or ASTM D 2172 Method B	Report
Bulk Specific Gravity of Compacted Samples ^{a, b} : CT 308, Method C	Report
Maximum Theoretical Specific Gravity ^b : CT 309, including provisions of Section J	Report
Air Voids of Compacted and Cured Specimens ^b : CT 367 Part B	Report
Marshall Stability, Cured Specimen ^b : AASHTO T 245 104 °F (min)	1250 lb
Marshall Retained Stability, AASHTO T 245, 104 °F based on Moisture Conditioning on Cured Specimen (min) ^{b, c}	70% ^d
Indirect Wet Tensile Strength, Cured Specimen ^{a, b, d} : AASHTO T-283,	Report
Indirect Dry Tensile Strength, Cured Specimen ^{a, b, d} : AASHTO T-283	Report
Ratio of Emulsion Residue to Cement (min)	3.0
Raveling Test of Cold Mixed Bituminous Emulsion, ASTM D 7196, 50 °F (max)	7.0
RAP Coating Test, ASSHTO T59 ^e , (min)	Good

Notes:

^a 4-inch diameter mold compaction based on either 75 blow Marshall on each side or gyratory compactor at 30 gyrations.

^b Test specimens after 140°F curing to constant weight between 16 hours and 48 hours.

^c Vacuum saturation from 55 percent to 75 percent. Water bath at 77 °F for 23 hours, with the last 30 minutes to 40 minutes in 104 °F water bath.

^d The Marshall Retained Stability ratio may be reduced to 60%, providing the saturated Marshall Stability is at least 1500 lbs.

^e Modify ASSHTO T59 using jobsite RAP, emulsified recycling agent and water application rates that have been determined in the CCPR mix design and submitted in job mix formula.

During the mix design, the Contractor shall determine the target values for penetration at 25°C and viscosity at 60°C of the emulsified recycling agent to be used in production of the recycled pavement mixture.

The mix design report shall include gradation of dry RAP, RAP asphalt content, recommended mixing water content range as a percentage of dry RAP; optimum emulsion content as a percentage of dry RAP; amount of cement additive as a percentage of dry RAP;

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and corresponding density, air void level, Marshall stability, retained stability, compaction method used to determine reported stability, and raveling at recommended moisture and emulsion contents. For the emulsified recycling agent and cement additive, include the designation, company name, location, residue content, and Certificates of Compliance.

MATERIALS

Emulsified Recycling Agent – The type of emulsified recycling agent to be used shall be determined by the mix design. An experienced and qualified technician (“Qualified Technician”) shall be at the job site during mixing operations to monitor the characteristics and performance of the emulsified recycling agent. Throughout the job the Qualified Technician shall be available to monitor the mixing, placement and compaction of the recycled asphalt concrete and make adjustments to the emulsified recycling agent formulation as required to improve coating, increase or decrease moisture content to aid in compaction or adjust breaking properties of the emulsion.

The asphalt binder used to make the emulsified recycling agent shall be in compliance to the Bending Beam requirements of the Performance Graded (PG) Asphalt Binder Specification AASHTO M320. This will verify its suitability in meeting the low temperature climatic requirements of the given region where the recycled asphalt concrete will be placed.

The Certificate of Compliance (COC) shall indicate the target value for penetration and the Bending Beam results. The Emulsified recycling agent shall be a polymer modified rejuvenating emulsion with a latex polymer, rejuvenating agent, and asphalt and shall conform to the requirements of Table 2:

Table 2

Emulsified Recycling Agent Requirements			
	Test Method	Requirement	
		Minimum	Maximum
Tests on emulsion:			
Sieve test, % of weight sample	AASHTO T59 a	---	0.1
Residue by distillation, %	AASHTO T59 a	60	--
Total Distillate from distillation	AASHTO T59 a	--	1.0
Tests on residue by distillation:			
Penetration at 25°C, 100 g / 5 sec (TV) (min)	AASHTO T49 ^{b,d}	TV +/- 25 percent ^c	
Absolute Viscosity at 60°C, pascal second (x10-1) (TV) ^c	AASHTO T2171	Report Only	

Notes:

^a Modify AASHTO T 59 - distillation temperature of 350°F with a 20 minute hold.

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- b Target value (TV) is determined for emulsified recycling agent chosen for use and submitted in job mix formula.
- c Sieve residue from distillation on No. 20 sieve before determining viscosity.
- d Modified procedure may be used: The sample shall be removed from the bath, shaken gently to remove free water from the surface of the specimen, tested in a dry surface state, and then immediately replaced in the water bath in less than 60 seconds. Repeat for determination.

The Contractor shall provide current test results and a COC for the emulsified recycling agent and cement additive at the time of mix design. A COC shall also be provided for each load delivered to the jobsite. The Contractor shall obtain two 1-quart minimum samples of emulsified recycling agent from each load delivered to the project. One sample shall be used for the Contractor's quality control testing. The remaining samples shall be delivered to the Engineer at the end of each working day. Emulsified recycling agent shall be sampled in plastic containers that are clean, dry, and sealed. Each sample shall be labeled with the date and time sampled and the bill of lading number from the delivery vehicle. Emulsion samples shall be retained and protected from damage or contamination by the Contractor until the project is accepted.

Crushed RAP - The stockpiled RAP shall be crushed and screened as necessary to conform to the following gradation prior to the addition of the emulsified recycling agent:

Sieve Size	Percentage Passing
1-Inch	100

Rubberized crack filler, pavement markers, loop wires, thermoplastic markers, fabric and other like materials that may be incorporated into the RAP as it is removed from the roadway shall be removed by the screening process. A minor amount of these residual materials that cannot be completely removed from the processed RAP may be incorporated into the recycled mix if the Contractor can demonstrate that those added materials will not adversely affect the performance of the recycled asphalt pavement. Any such materials retained in the mix shall be appropriately sized and blended so as not to adversely affect the appearance or strength of the recycled pavement.

Crushed and screened RAP shall not be stockpiled for longer than 10 days or in stockpiles greater than 20 feet in height that may, through the weight of the stockpile, reconsolidate the crushed and screened RAP. Water shall be added to the RAP as it is screened and crushed to abate dust and mitigate reconsolidation.

Water - Water may be added to facilitate the uniform mixing of the emulsified recycling agent and the processed RAP. Water added to the recycled asphalt concrete shall be potable, clean and free from deleterious concentrations of acids, alkalis, salts, sugar and other organic

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or chemical substances. The water shall not contain an amount of impurities that will cause a reduction in the strength of the recycled asphalt concrete pavement. If the water is of questionable quality, it shall be tested in accordance with AASHTO T26.

Cement Additive – Type II Portland cement shall be added to the recycled pavement mixture to meet the requirements of Table 1 and to aid in curing and early strength gain. Source and percentage used shall be described in the job mix formula submittal.

CONSTRUCTION METHODS

Weather Limitations - Recycling and placement operations shall not be performed during wet conditions or if rain or cold conditions (less than 50°F) are imminent or predicted to exist at any time. “Imminent or predicted” is defined as being forecasted within a 48-hour period on the National Weather Service Web Site <http://www.wrh.noaa.gov> for the most representative and nearest location listed where recycling is to begin and end.

Recycling and placement operations shall not be performed unless the ambient temperature is a minimum of 50°F and unless the National Weather Service Web Site forecasts that the ambient temperature will be a minimum of 60°F within 3 hours after the start of placement operations and will remain above 60°F throughout the recycling operation until all initial compaction and protection efforts have been completed for that day’s run.

Recycling mixing operations shall be ceased if actual ambient temperatures drop below 60°F anytime after the initial 3-hour window following start-up. In the event CCPR pavement is placed and weather conditions deteriorate soon after, it is then a requirement that all traffic stay off the recycled mat until weather conditions improve (temperature rises and humidity drops) and the recycled section has “cured” sufficiently for secondary compaction to take place in accordance with the **Cure and Maintenance** requirements of this specification. The Contractor will be responsible for maintaining and protecting the recycled surface. Any recycled asphalt surfacing damaged by inclement weather shall be replaced by the Contractor at the Contractor’s expense as directed by the Engineer.

All CCPR mixing and paving operations shall be completed a minimum of 2 hours before sunset to allow for compaction and protection operations.

Subgrade and Surface Preparation – Prior to placing recycled pavement the subgrade soils/base shall be properly prepared, moisture treated and compacted to a minimum of 95 percent relative compaction based upon ASTM D 1557 so as to create an evenly graded, unyielding surface. If the recycled pavement is to be placed on an existing milled pavement surface it shall be verified that the milled surface is firm and unyielding and there are no subgrade failure areas beneath the milled surface that might compromise the integrity of the recycled pavement. Base repairs will be performed as per plans. When CCPR pavement is placed on a milled surface or adjacent to structures such as curbs, concrete gutters, swales, planters, etc... these contact surfaces shall be swept of all loose material to create a dry clean surface. A tack coat of diluted (50:50) SS-1h emulsion, emulsified recycling agent or equivalent (0.05 gallon per square yard minimum) shall be applied to all surface areas prior to placing the recycled pavement. If CCPR is to be paved directly on cement stabilized subgrades or bases (CSS, CTB, CSPB, FDR) a prime coat of SS-1h, CSS-1h, or equivalent may be required to be applied to the stabilized surface at the Engineer’s discretion.

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CCPR pavement is not recommended as a direct overlay on existing asphalt pavement without first milling the underlying pavement to aid in bonding and to prevent slippage. Successive layers of recycled pavement may be paved without milling but requires that each layer be fully cured and compacted before placing the overlay section. See “**Placement**” in this specification.

Mixing and Proportioning – The recycled material shall be processed through a material sizing unit having screening and crushing capabilities to reduce the RAP to the maximum size of 1-inch prior to mixing with the emulsified recycling agent.

After crushing and sizing, the recycled material shall be processed in a mixing unit capable of processing the sized RAP, emulsified recycling agent, water and cement additive to a homogeneous mixture to produce recycled asphalt concrete. The mixing unit shall be equipped with a belt scale for the continuous weighing of the RAP and a coupled/interlocked computer-controlled liquid metering device. The mixing unit shall be an on-board completely self-contained counter rotating twin shaft pugmill appropriately rated by the manufacturer for the production levels used by the Contractor. The liquid metering device shall be capable of automatically adjusting the flow of emulsified recycling agent to compensate for any variation in the weight of the RAP introduced into the pugmill. Emulsified recycling agent shall be metered by weight of RAP using a mass flow, coriolis effect, type meter that will accurately measure the amount of emulsified recycling agent to within 0.5 percent of the amount required by the mix design or as adjusted in the field and approved by the Engineer. Cement additive and water as required, shall be controlled and metered using the weight of the RAP introduced into the pugmill. Additives may be introduced volumetrically or by weight per the mix design. The CCPR Contractor shall calibrate and verify the accuracy of the recycle plant not less than five days before recycle operations are to begin.

Automatic digital readings shall be displayed for both the flow rate and total amount of RAP, emulsified recycling agent, and additives in appropriate units of weight and time.

The emulsified recycling agent, cement additive and water shall be incorporated into the graded RAP at the initial rate determined by the mix design and approved by the Engineer. The total water content shall include that amount present in the stockpile and additional mixing water at the pugmill if required. Adjustments in the rate of emulsified recycling agent, cement additive and water shall be determined by the Qualified Technician and made as necessary based on the coating, compaction and breaking properties of the recycling emulsion. Sampling variations and mix design may determine the necessity of different levels of emulsified recycling agent and/or additives in various sections of the project.

When a paving fabric is encountered during the cold milling operation, the CCPR Contractor shall make the necessary changes in equipment or operations so that incorporation of the shredded fabric in the recycled material does not affect the performance parameters of the recycled asphalt concrete or inhibit placing or compaction of the CCPR pavement. No fabric piece incorporated into the recycled section shall have any dimension exceeding a length of 2-inches. The Contractor shall be required to remove and properly dispose of oversized pieces of paving fabric as directed by the Engineer. Similarly, loop wires, pavement markers, rubberized crack fill materials, thermoplastic marking materials, milled concrete, and other materials that may be incorporated into the RAP through the milling process shall be removed

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from the recycled material unless the Contractor can demonstrate that minor amounts of residual materials that remain will not compromise the integrity of the recycled asphalt.

Transportation – Trucks with smooth clean beds shall be used to haul the recycled asphalt concrete mixture to the placement area. The loaded trucks shall deliver the blended material into the paver within 1 hour of mixing or before the emulsion begins to break and set, whichever time is earlier.

Placement – Recycled pavement shall be spread using a self-propelled paver having electronic grade and cross slope control for the screed. The equipment shall be of sufficient size and power (minimum 170 hp), equipped with paving skis to spread the recycled material in one continuous pass, without segregation, to the lines and grades established by the Engineer and according to Plans. Heating of the paver screed is not permitted.

CCPR pavement shall be placed to the finished thickness as specified by the Engineer. A single lift thickness shall be at a minimum compacted depth of 2-inches and not exceed a maximum compacted depth of 4-inches. Before placing any additional lifts, the recycled surface shall be allowed to cure until the moisture of the material is reduced to 2.0 percent or less or has remained in place for a minimum of 10 days without rainfall upon the Engineer's approval. Compaction of the first layer, and any subsequent layers to be overlaid shall be performed and verified per the **Compaction** and **Cure and Maintenance** requirements of this specification. Prior to installing any additional lifts, contact surfaces shall be carefully swept of all loose material to create a dry clean surface. A tack coat of SS-1h emulsion, emulsified recycling agent or equivalent (0.05 gallon per square yard minimum) shall be applied to all surface areas prior to placing any additional lifts.

When a pick-up machine is used for transferring the recycled material from a windrow to the receiving hopper of the paver, the pick-up machine shall be capable of removing and transferring the entire windrow of recycled mix in a single pass.

Handwork of CCPR pavement shall be minimized and care shall be taken to prevent segregation. The wings of the paver shall be emptied regularly to prevent buildup and to minimize segregation.

Compaction - Compacting the recycled mix shall be completed using self-propelled rollers, complete with properly operating scrapers and water spray systems. Rollers of the vibratory-steel drum and pneumatic tired type shall be used. They shall be in good condition, capable of operating at slow speeds to avoid displacement of the mixture.

Compaction operations shall start no more than 15 minutes behind the paver, unless the ambient temperature is below 60 deg F. For each 5 deg below 60 deg F another 10 minutes can elapse before rolling begins, or at the direction of the Qualified Technician and/or Engineer. The number, weight and types of rollers shall be as necessary to obtain the required compaction. At a minimum the following rollers shall be used:

At least one pneumatic roller with a minimum gross operating weight of not less than 25 tons. Tires on the pneumatic rollers shall be evenly inflated and matched in size and profile so as to maximize compactive effort.

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At least one double drum steel vibratory roller with a gross operating weight of not less than 10 tons with a minimum drum diameter of at least 60-inches.

Rolling patterns shall be established in the field by the Contractor and verified by the Engineer to achieve a maximum density determined by nuclear density testing. A rolling pattern for compaction shall be determined such that no increase in density is shown on successive nuclear density tests (per ASTM D 2950) for any additional passes of the compaction equipment once the maximum density pattern has been identified ("break over point"). Nuclear density testing shall be repeated throughout the time compaction is being completed to continuously verify the compaction is achieving maximum density results by establishing a rolling vs. density chart that shows the progress of densification from initial breakdown compaction through maximum obtainable density at the break over point.

Care shall be taken not to over compact the mat. A Qualified Technician shall be on site and observing all compaction efforts, monitoring density gauge readings, and approving areas as they reach maximum density. The minimum rolling pattern shall be as follows:

Two complete coverages with the double drum steel vibratory roller immediately after the recycled mix is placed. The first coverage shall be made without the vibratory unit turned on and the second with the vibratory unit operating.

Two complete coverages with the pneumatic-tired roller shall be made after the initial passes of the steel roller.

Final rolling, before cure, to eliminate pneumatic tire marks and to achieve maximum density shall be done by the double drum steel roller, either operating in a static or vibratory mode.

Nuclear density testing shall be repeated throughout the time secondary compaction is being completed to continuously verify that the secondary compaction is within 5% of the maximum density results. A Qualified Technician shall be on site and observing all compaction efforts, monitoring density gauge readings, and approving areas as they reach maximum density. The recycled mat shall be continuously observed during compaction efforts. If moisture cracking occurs under the vibratory compaction mode, the vibrators shall be turned off and static rolling only applied. If moisture cracking of the mat continues under static steel rolling, steel drum compaction shall cease, the mat shall be allowed to cure for a time in order for some moisture to escape, and pneumatic rolling commenced, followed by steel rolling to iron out irregularities from the rubber-tired roller(s). This procedure shall be followed until there is no longer any displacement of the mat observed by roller action on the recycled surface.

The selected rolling pattern shall be followed unless changes in the recycled mix or placement conditions occur and a new rolling pattern is established at that time. Any type of rolling that causes cracking, major displacement and/or any other type of pavement distress shall be discontinued until such time as the problem can be resolved. Discontinuation and commencement of rolling operations shall be at the discretion of the Engineer.

Extra care shall be taken to ensure that aggregate from the recycled mixture does not stick to the drums or wheels of the rollers. Water shall be uniformly applied to the wheels and drums, along with mechanical means to keep aggregate from sticking. Sufficient water shall be applied to keep rollers and tires clean, but not so much that water pools or ponds on the

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recycled surface.

Rollers shall not be started or stopped on uncompacted recycled material. Rolling patterns shall be established so that starting and stopping shall be on previously compacted material or the adjacent, existing surfacing.

Cure and Maintenance – After the completion of compaction of the recycled material, no traffic, including that of the Contractor, shall be permitted on the recycled material for at least two hours. This may be reduced if sufficient care is established for traffic that will not initiate raveling. A fog seal of dilute (50 to 60 %) SS-1h emulsion, emulsified recycling agent or equivalent (0.08 to 0.12 gallon per square yard) shall be applied after initial compaction or after the secondary compaction, as outlined below, to all areas opened to significant traffic depending on curing of the CCPR pavement. To prevent pickup of the fog seal, the recycled pavement surface shall be covered with sand at a rate of 1.0 to 2.0 pounds per square yard. Excess sand shall be removed from the pavement surface by careful sweeping. Sand shall be free from clay or organic material. Fog sealing and/or sanding shall be initiated at the Engineer's direction.

After opening to traffic, the surface of the recycled pavement shall be maintained in a condition suitable for the safe movement of traffic. Before placing the final surfacing, the recycled surface shall remain in-place:

- For a minimum of 2 days and until there is less than 2.0 percent moisture remaining in the recycled pavement mixture; or
- A minimum of 10 days without rainfall.

Secondary Compaction - Two complete coverages (minimum), after cure and before placing any AC overlay or other surface seal shall be conducted with the pneumatic and steel drum roller. A rolling pattern shall be reestablished to determine the maximum density of final rolling. Density of the recycled pavement shall be verified behind the secondary compaction by nuclear density gauge. A rolling pattern for the secondary compaction shall be determined such that no increase in density is shown on successive nuclear density tests (per ASTM D 2950) for any additional passes of the compaction equipment once the maximum density pattern has been identified. Nuclear density testing shall be repeated throughout the time secondary compaction is being completed to continuously verify that the secondary compaction is within 5% of the maximum density results. Care shall be taken not to over compact the mat. A Qualified Technician shall be on site and observing all secondary compaction efforts, monitoring density gauge readings, and approving areas as they reach maximum density.

The Contractor shall protect and maintain the recycled surface from nuisance water, other deleterious substances, and/or any other damage. Any damage to the completed recycled material shall be repaired by the Contractor prior to the placement of new asphalt concrete or final surface sealing. Areas damaged shall be excavated to the depth directed by the Engineer and/or filled and compacted with new asphalt concrete. All loose particles that may develop on the pavement surface shall be removed prior to the final surface course. No direct payment will be made and costs shall be included elsewhere for protection and maintenance of the recycled asphalt concrete pavement.

Prior to any overlay with asphalt concrete, the recycled pavement should be carefully swept

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of all loose material to create a dry clean surface. A tack coat of SS-1h emulsion, emulsified recycling agent or equivalent (0.05 gallon per square yard minimum) shall be applied to all surface areas.

Smoothness – The finished surface and grade of the recycled material shall be checked regularly during placement using a level. The smoothness shall not vary more than ¼ inch from a 10-foot straight edge placed on the surface. The Contractor shall correct humps or depressions exceeding this tolerance. High points may be trimmed if approved by the Engineer in the field.

MATERIAL ACCEPTANCE

Gradation - A sample shall be obtained from the pugmill for each 500 tons of RAP addition to verify the maximum particle size requirement is being met. The first sample and every third sample thereafter shall be compared to the gradation band determined during the mix design by performing a wet field gradation for material passing the 1-inch to No. 4 sieves. The CCPR Contractor shall adjust the emulsified recycling agent as needed.

Emulsified Recycling Agent – A Certificate of Compliance from the emulsion manufacturer shall accompany each shipment to the Project. The CCPR Contractor shall perform a sieve test in accordance with ASTM D 2444 to verify the emulsion is stable prior to using each load. The Contractor shall obtain two 1-quart minimum samples of emulsified recycling agent from each load delivered to the project. One sample shall be used for the Contractor's quality control testing. The remaining samples shall be delivered to the Engineer at the end of each working day. Emulsified recycling agent shall be sampled in plastic containers that are clean, dry, and sealed. Each sample shall be labeled with the date and time sampled and the bill of lading number from the delivery vehicle. Emulsion samples shall be retained and protected from damage or contamination by the Contractor until the project is accepted.

Emulsified Recycling Agent Content – Emulsion content shall be checked and recorded for each segment in which the percentage is changed. Emulsion content changes shall be made based upon if coating and adequate dispersion is not being achieved and if the mix design indicates the CCPR pavement will be stable. Emulsified recycling agent content shall be checked from the belt scale totalizer and asphalt pump totalizer, verified by the delivery weight tickets.

Cement Additive –A Certificate of Compliance from the additive manufacturer shall accompany each shipment to the Project.

Cement Additive Content – Additive content shall be checked and recorded for each segment in which the additive is used per the mix design. Additives shall be checked from the belt scale totalizer and verified by the delivery weight tickets.

Recycled Material Compacted Density - Wet density shall be determined using a nuclear moisture-density gauge generally following the procedures for ASTM D 2950, backscatter measurement. A rolling pattern shall be established such that a maximum density is achieved with the rollers specified, based on relative nuclear density readings.

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The contract unit price paid for ***Bid Item 24 and A1-6, Cold Central Plant Recycling (4-inch Depth)*** will be per **SQUARE YARD** of CCPRACP placed, and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in placing CCPRACP. This includes providing mix design; just-in-time training of personnel; milling, crushing, screening, stockpiling of aggregates; mixing, proportioning, spreading, finishing, and compacting CCPRACP; inspection, fog sealing, and testing and reporting as part of the Quality Control Program; and no additional compensation will be allowed therefor.

10-1.16 HOT MIX ASPHALT

HMA Type A shall be produced and placed according to Section 39-2, "Hot Mix Asphalt," of the State Specifications and using the "Standard" construction process, except as modified below. The work includes the construction of HMA overlays and HMA plugs where curb & gutter or curb ramps are being replaced.

The Contractor shall submit an asphalt concrete mix design including gradation and properties of aggregate for each mix proposed to be used. Each mix shall satisfy the requirements of Section 39, "Hot Mix Asphalt," and Section 92, "Asphalt Binders," of the State Specifications.

Mix designs shall be accompanied by current test results that indicate compliance with the State Specifications as well as a Certificate of Compliance for liquid asphalt from the manufacturer stating that the material used complies with the requirement of the State Specifications.

The job mix formula shall establish a single percentage of aggregate passing each required sieve size and a percentage of asphalt binder to be added to the aggregate. The asphalt concrete binder content shall be based on 4.0% air voids.

Said job-mix formula shall be determined using the specifications set forth herein. If the Contractor elects to use any material, including blending material, other than those materials utilized in the mix design, he/she shall so inform the Engineer in advance of the production of asphaltic concrete and shall document the request through an approved testing laboratory. Engineer shall make approval decision regarding such material.

The grade of asphalt binder mixed with aggregate for HMA Type A must be PG 64-10 per Section 92 of the State Specifications.

The aggregate for HMA Type A must comply with the 1/2-inch aggregate gradation.

The minimum compacted thickness of asphalt concrete shall be the thickness shown on the Plans. The maximum compacted lift thickness shall be 0.25 feet. The tolerance for minimum thickness for all operations shall be 0.01 feet. The tolerance for maximum thickness for asphalt concrete structural sections less than 0.35 feet thick shall be 0.02 feet, and for sections more than 0.35 feet thick shall be 0.03 feet.

The Contractor shall apply a tack coat to all surfaces receiving HMA and between HMA lift

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according to Section 39-2.01C(3)(f), "Tack Coat," of the State Specifications and at the residual rates specified. The application rate for various surfaces shall be as specified for SS-1h. Before opening the lane to public traffic, the Contractor shall pave shoulders and median borders adjacent to the lane being paved.

Paving work shall be a continuous non-stop operation with delivery trucks arriving in a uniform manner or such that delivered material temperatures meet specifications when placed into paver. The City's representative will meet daily with the Contractor to evaluate the Contractor's operations relative to the work time restrictions.

The asphalt concrete shall be delivered to the site in a thoroughly blended condition and shall be spread by a self-propelled asphalt paving machine in such a manner as to avoid particle and thermal segregation during the placing operations. Joint and edge raking that leaves a segregated surface and/or low areas surrounding paving joints is prohibited.

No asphalt concrete shall be placed when the atmospheric temperature is below 50°F.

No paving work whatsoever shall be allowed when the roadway or subgrade is moist or damp or when it is raining. For the purpose of this provision, "raining" shall mean any weather condition that causes the roadway to become moist or damp. In the case of sudden precipitation, all paving work must stop immediately. All asphalt concrete on site not yet placed and all asphalt concrete in transit from the plant shall be rejected, and no payment will be allowed.

The Contractor shall be responsible for removal of vegetation from the edge of pavement, edge and crack cleaning, crack sealing, sweeping, washing and/or any special cleaning to leave a clean surface ready to receive a tack coat and asphalt concrete. A power wash shall be used in the deceleration zones of intersections for the complete removal of dust that may cause overlay slippage. Excess water shall be removed prior to application of tack coat.

Asphalt placement shall conform to the requirement for an accessible-compliant landing at the base of each curb ramp. Accessible-compliant landings shall extend 2-feet into the road as measured from the gutter flowline at the base of the ramp. The maximum cross-slope in this area shall not exceed 2.0% and the maximum longitudinal slope shall not exceed 5.0%.

Placement of asphalt in these accessible-compliant areas may require placement by hand and may require a smaller roller to meet the slope requirements. Meeting pavement density in these areas is still a specification requirement. Minimize aggregate segregation in these areas during hand work.

Surplus asphalt material raked into the gutters shall be removed from job site on a daily basis. Any "green waste" or yard debris that is moved off of the street shall be moved back into street on the same day. Paving operation shall NOT occur on trash pickup day.

Measurement and Payment

The contract unit price paid for ***Bid Item 25 and A1-7, Hot Mix Asphalt Pavement (2.5 Inches)***, ***Bid Item 26, Hot Mix Asphalt Pavement (3 Inches)***, and ***Bid Item 27, Hot Mix Asphalt Pavement (8 Inches)*** will be per TON of HMA placed, and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for

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doing all the work involved construct HMA pavement to the thickness specified on the plans, including, but not limited to, providing mix design, tack coat, and placement and compaction of HMA as directed by the Engineer and no additional compensation will be allowed therefor.

10-1.17 TRAFFIC STRIPES, PAVEMENT MARKINGS, AND MARKERS

Pavement markings and traffic striping shall be thermoplastic and shall be applied in conformance with the provisions in Section 84-2, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these Special Provisions, with two exceptions. Firstly, all thermoplastic traffic stripes composing the various details shall be 4-inches wide. Secondly, "Thermoplastic 4-Inch Line (White or Yellow)" shall instead be applied in conformance with the 2015 Standard Plan. Pavement markings shall include all work and materials required to install thermoplastic traffic striping and pavement markings.

Thermoplastic material shall be free of lead and chromium and shall conform to the requirements in State Specification PTH-02ALKYD.

Retroreflectivity of the thermoplastic pavement markings shall conform to the requirements in ASTM Designation: D 6359-99. White thermoplastic pavement markings shall have a minimum initial retroreflectivity of $250 \text{ mcd m}^{-2} \text{ lx}^{-1}$. Yellow thermoplastic pavement markings shall have a minimum initial retroreflectivity of $150 \text{ mcd m}^{-2} \text{ lx}^{-1}$.

Before the permanent pavement markings are applied, the Contractor shall provide "cat-track" marking layout for review and approval of the Engineer. Changes, if any, to the marking layout as a result of the Engineer's review shall be the responsibility of the Contractor. If the Contractor fails to obtain the Engineer's approval of the marking layout prior to the permanent marking installation, changes to the permanent markings as required by the Engineer, including removal and replacement, shall be the Contractor's responsibility.

Contractor shall restore thermoplastic striping for crosswalks and stop bars within fourteen (14) days of final lift, which includes a minimum of seven (7) days for HMA or RHMA pavement cure time.

Thermoplastic traffic stripes shall be applied at the minimum thickness and application rate as specified below. The minimum application rate is based on a solid stripe of 4 inches in width.

Minimum Stripe Thickness (inch)	Minimum Application Rate (lb/ft)
0.079	0.27

Where striping joins existing striping, as shown on the plans, the Contractor shall begin and end the transition from the existing striping pattern into or from the new striping pattern a sufficient distance to ensure continuity of the striping pattern.

Thermoplastic pavement markings shall be free of runs, bubbles, craters, drag marks, stretch marks, and debris.

Pavement Markings shall be constructed in conformance with the State of California Standard

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Plans A24A through A24E, the project plans, and as directed by the Engineer.

Reflectorized markers shall be installed accurately at the locations called for in the Special Provisions, project plans, or as required by the CA MUTCD.

The portion of the street surface, which will receive the pavement markers, shall be free of dirt, oil, moisture, or any other material that would adversely affect the bonding of the adhesive.

Adhesive for pavement markers shall be either rapid set epoxy or hot melt bituminous adhesive conforming to the requirements of Section 81-3, "Pavement Markers," of the Standard Specifications.

Adhesive shall be placed in sufficient quantity to completely cover the bottom of the marker with no voids and with slight excess after the marker has been pressed into place. The marker shall be protected against impact until the adhesive has hardened.

Thermoplastic aggregate shall be a neutral, light color that will not affect the color of the finished product and will have a mesh sizing of 24 Grit. Skid >60 ASTM E303.

Measurement and Payment

The quantities for striping and markings will be measured and paid as follows:

- a) ***Bid Item 28, Thermoplastic Traffic Stripe – Detail 9*** paid per **LINEAR FOOT**
- b) ***Bid Item 29, Thermoplastic Traffic Stripe – Detail 12***, paid per **LINEAR FOOT**
- c) ***Bid Item 30, Thermoplastic Traffic Stripe – Detail 27***, paid per **LINEAR FOOT**
- d) ***Bid Item 31, Thermoplastic Traffic Stripe – Detail 38***, paid per **LINEAR FOOT**
- e) ***Bid Item 32, Thermoplastic Traffic Stripe – Detail 39***, paid per **LINEAR FOOT**
- f) ***Bid Item 33, Thermoplastic Traffic Stripe – Detail 39A***, paid per **LINEAR FOOT**
- g) ***Bid Item 34, Thermoplastic Traffic Stripe – Detail 40***, paid per **LINEAR FOOT**
- h) ***Bid Item 35, Thermoplastic Traffic Stripe – 4-inch Yellow Line***, paid per **LINEAR FOOT**
- i) ***Bid Item 36, Thermoplastic White Limit Line***, paid per **LINEAR FOOT**
- j) ***Bid Item 37, Thermoplastic Basic Crosswalk (White or Yellow)***, paid per **LINEAR FOOT**
- k) ***Bid Item 38, Thermoplastic Pavement Markings (Arrows Words, and Numerals; White or Yellow)***, paid per **SQUARE FOOT**.

The contract prices paid per linear foot for the various striping and thermoplastic stripes shall include full compensation for furnishing all labor, supervision, materials, tools, equipment, and incidentals and for doing all the work involved including, but not limited to, any necessary cat tracks; dribble lines and layout work; cleaning surfaces to receive stripes, markers and paint; thermoplastic; and all other work as shown on the plans, as specified in the State Standard Specifications and these Special Provisions Specifications, and as directed by the Engineer and no additional compensation shall be allowed therefor.

Traffic stripes will be measured and paid for by the linear foot along the line of the traffic stripes (without deductions for gaps except at intersections), shown in the Caltrans standard plan details. Gaps in traffic stripes through intersections will not be measured or paid for. Pavement markers that are part of the corresponding details in the Caltrans standard plans

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shall not be measured separately.

The contract price paid for "Thermoplastic Pavement Markings (Arrows, Words, and Numerals; White or Yellow" shall include full compensation for furnishing all labor, supervision, materials, tools, equipment and incidentals and for doing all work involved in placing thermoplastic pavement markings, including, but not limited to, any necessary layout work and stencils, thermoplastic and all other work as shown on the plans, as specified in the State Standard Specifications and these Special Provisions Specifications and as directed by the Engineer and no additional compensation shall be allowed therefor.

10-1.18 INDUCTIVE TRAFFIC LOOP DETECTORS

Traffic signal loop detectors identified on the plans shall be replaced by new inductive loop detectors as shown on the Plans. Installation of conduit and handhole for loop detector wires, if required and as directed by the Engineer, are also included. The exact amount of conduit to be replaced is not known. For estimating purposes the Contractor shall include 100 linear feet of conduit in the bid price for traffic detector loops.

All work shall conform to the provisions of Section 86, "Electrical Work" of the State Standard Specifications, applicable portions of Standard Plans ES-5A and ES-5B, the traffic loop manufacturer recommendations and these technical specifications. Traffic detector loops obliterated during the construction of the project shall be replaced within 48 hours.

10-1.18A CONDUIT

Conduit which is installed underground shall be Type 3, rigid, nonmetallic type, Schedule 40. All conduits shall enter a pullbox with a 90 degree elbow, unless permitted otherwise by the Engineer.

All conduits shall have a 1/4 inch pullrope installed in them.

After conductors have been installed, the ends of the conduits terminating in pull boxes and controller cabinets shall be sealed with a sealing compound approved by the Engineer.

When a standard coupling cannot be used for coupling metal type conduit, a UL listed threaded union coupling, as specified in Section 87-1.03B, "Conduit Installation," of the State Standard Specifications, or a concrete tight split coupling or concrete tight set screw coupling shall be used.

Conduit runs may be located behind curbs or installed in the street.

Trenching for conduit installation within the street section is PERMITTED if delay to any vehicle will not exceed 10 minutes. The top of the installed conduit shall be a minimum of 1 foot below finish grade in the street section. The trench shall be backfilled with commercial quality concrete.

All trenches shall be finish paved within 24 hours of the installation of the Portland cement concrete backfill. If the contractor does not comply with this section, the Engineer will order the work done by others and deduct the cost of doing the work from monies due the

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Contractor.

When rigid non-metallic conduit is placed in a trench other than in the street section, and after the conduit is installed, the trench shall be backfilled with PCC Slurry. No native material backfill will be permitted.

The conduit in a foundation and between a foundation and the nearest pullbox shall be the rigid non-metallic type.

10-1.18B DETECTORS

Loop wire shall be Type 1. The loop lead-in cable shall be Type B.

Each cable shall be identified in the pull-box nearest the loop and in the controller cabinet as to its "phase and loop number."

Detector sensor units shall be "Detector Systems Model 222", or approved equal. Detector sensor units furnished shall function without "locking up". If the detector sensor units furnished for the contract continually lock up when tuned for a motorcycle or bicycle, all sensor units shall be replaced with another brand of detector.

Conductors to be buried in the pavement shall be installed only in the presence of the Engineer. All loops shall be connected in series (electrically, not mechanically).

The loops shall be installed on the existing surface of the roadway following planing and application of the final overlay course of hot mix asphalt concrete.

Detector lead-in cable (DLC) shall be installed from the pull box to the controller cabinet as directed by the Engineer. Where DLC is to be installed into an existing conduit system, the following procedure shall be followed:

1. Disconnect loop wires from DLC.
2. City Traffic Operations to place the signal controller on "Recall".
3. Remove the DLC to the controller cabinet.
4. Install DLC as directed by the Engineer.
5. Splice to loop wires and test detector function.

Contractor shall coordinate with the City operation prior to cutting existing detector loops.

Prior to saw cutting for loops, acceptance of layout lines/locations by the Engineer is required. Loops and loop wire shall be inspected by the Engineer prior to being installed.

10-1.18B HANDHOLES

Detector handholes shall conform to Detector Handhole details shown on Standard Plan ES-5D, of the State Standard Plans, these specifications, and as directed by the Engineer.

Where required, Detector Handholes shall be installed at the locations directed by the Engineer and shall be flush with the finish grade. The cement used to join the ABS sweep "Y"

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to the PVC conduit shall be capable of providing a solvent type weld between the two materials.

Measurement and Payment

The contract unit price paid for ***Bid Item 39, Inductive Type A Traffic Loop Detector; Bid Item 40, Inductive Type D Traffic Loop Detector; and Bid Item 41, Inductive Type E Traffic Loop Detector*** will be per **EACH**, and shall include full compensation for furnishing all labor, materials, tools, equipment, conduit, detector handhole, including but not limited to connection to existing pullbox, DLC, testing, incidentals, and performing all alterations necessary to complete the work in place to construct a functioning traffic signal system, as specified in the State Standard Specifications, these Technical Specifications, and as directed by the Engineer.