CITY OF EAST PALO ALTO, CALIFORNIA
DEPARTMENT OF PUBLIC WORKS – ENGINEERING DIVISION

ADDENDUM 4 ATTACHMENTS

ADDISON AVENUE SAFE ROUTE TO SCHOOL AND GREEN STREET IMPROVEMENTS PROJECT – 22
CIP-ST-26

ADDENDUM 4 ATTACHMENT A

Revised Bid Schedule

BID SCHEDULE

Notes:
1. The Contract will be awarded on the basis of Total Base Bid amount only.
2. The Addition of Additive Alternate Bid items does not change the basis by which the project will be awarded.
3. The bidder must complete the Alternate Bid in full for the bid to be considered.

BASE BID

Item Number	Item Description	Qty	Unit	Unit Cost	Total Cost
1	Mobilization	LS	1		
2	Progress Schedule (Critical Path Method)	LS	1		
3	Traffic Control	LS	1		
4	Stormwater Pollution Prevention	LS	1		
5	Construction Staking and Surveying	LS	1		
6	Utility Potholing - Design	EA	40		
7	General Utility Potholing	LS	1		
8	Reconstruct Fence - 2161 Addison Avenue	LF	20		
9	Reconstruct Fence and Gates – 2165 Addison Avenue	LF	51		
10	Reconstruct Fence and Gates – 2169 Addison Avenue	LF	50		
11	Reconstruct Fence and Gates – 2175 Addison Avenue	LF	50		
12	Reconstruct Fence and Gates - 2187 Addison Avenue	LF	50		
13	Reconstruct Fence - 2191 Addison Avenue	LF	30		
14	Reconstruct Fence - 2293 Addison Avenue)	LF	20		
15	Reconstruct Fence and Gate - 1240 Bay Road	LF	70		
16	Remove and Trim Trees	LS	1		
17	Remove Concrete	LS	1		
18	Cut-off Curb (Type 1)	LF	316		
19	Cut-off Curb (Type 2)	LF	378		
20	Concrete Curb Ramp	EA	10		
21	Concrete Curb and Gutter	LF	160		

22	Concrete Sidewalk	SF	2330		
23	Urban Curb, Gutter, and Sidewalk (Type D-3)	LF	320		
24	Driveway (Type D-1)	LF	214		
25	Driveway (Type D-2)	LF	40		
26	Vertical Curb (Type A1-6)	LF	32		
27	3-Ft Valley Gutter (Type D-5)	LF	530		
28	6-Ft Valley Gutter (Type D-5)	LF	33		
29	Miscellaneous Concrete	LS	1		
30	Full-Depth Reclamation – Cement	SY	2253		
31	Cement (Full-Depth Reclamation – Cement)	TON	95		
32	Hot Mix Asphalt (Type A)	TON	560		
33	Base for AC Pavement - Parking	SF	3650		
34	Base Failure Repair (Digout)	SF	6086		
35	Remove AC Speed Hump	EA	2		
36	Remove AC Pavement	LS	1		
37	AC Speed Hump	EA	2		
38	Crack Sealing	LS	1		
39	Slurry Seal	SY	3747		
40	Bioretention Areas	LS	1		
41	Planting	LS	1		
42	Irrigation	LS	1		
43	Landscaping Maintenance	LS	1		
44	Storm Drain Manhole	EA	5		
45	12” RCP	LF	1600		
46	Inlet Type GO	EA	1		
47	Overflow Inlet at Bioretention Area	EA	7		
48	Modify Existing Curb Inlet at Bioretention Area No. 8	EA	1		
49	Adjust Sanitary Sewer Manhole Frame and Cover to Grade	EA	1		

50	Reconstruct Sanitary Sewer Utility Lateral	EA	27		
51	Water Service Lateral	EA	16		
52	Abandon Water Service Lateral	EA	16		
53	Adjust Water Valve Box with Cover to Grade	EA	10		
54	Adjust Water Meter Box with Cover to Grade	EA	12		
55	Adjust Telephone Box with Cover to Grade	EA	2		
56	Project Funding Sign	EA	2		
57	Remove Roadside Sign	EA	29		
58	Salvage Pedestrian Barricade w/ Sign	EA	2		
59	Remove Striping, Pavement Markers, and Pavement Markings	LS	1		
60	Thermoplastic Pavement Markings	SF	552		
61	Crosswalk and Limit Line Stripe	SF	1804		
62	Detail 22 Striping	LF	200		
63	Detail 23 Striping	LF	224		
64	Educational Sign	EA	2		
65	Pedestrian Barricade w/ Sign	EA	2		
66	Roadside Sign (Salvaged Sign)	EA	29		
67	Replacement Sign	EA	20		
68	Two-way Reflective Blue Pavement Markers	EA	7		
				TOTAL BASE BID	

Total Base Bid in Words:

_____

ADDENDUM 4 ATTACHMENT B

Redline of Original Bid Schedule

SUPPLEMENTAL PROJECT INFORMATION
BID SCHEDULE MARKUP

Notes:
1. The Contract will be awarded on the basis of Total Base Bid amount only.
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3. The bidder must complete the Alternate Bid in full for the bid to be considered.

BASE BID

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3	Traffic Control	LS	1		
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6	Utility Potholing - Design	EA	40		
7	General Utility Potholing	LS	1		
8	Reconstruct Fences - 2161 Addison Avenue	LF	20		
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10	Reconstruct Fence and Gates – 2169 Addison Avenue	LF	50		
11	Reconstruct Fence and Gates – 2175 Addison Avenue	LF	50		
12	Reconstruct Fence and Gates - 2187 Addison Avenue	LF	50		
13	Reconstruct Fence - 2191 Addison Avenue	LF	30		
14	Reconstruct Fence - 2293 Addison Avenue)	LF	20		
15	Reconstruct Fence and Gate - 1240 Bay Road	LF	70		
16	Remove and Trim Trees	LS	1		
17	Remove Concrete	LS	1		
18	Cut-off Curb (Type 1)	LF	316		
19	Cut-off Curb (Type 2)	LF	378		
20	Concrete Curb Ramps	EA	10		
21	Concrete Curb and Gutter	LF	160		

22	Concrete Sidewalk	SF	2330		
23	Urban Curb, Gutter, and Sidewalk (Type D-3)	LF	320		
24	Driveway (Type D-1)	LF	214		
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27	3-Ft Valley Gutter (Type D-5)	LF	530		
28	6-Ft Valley Gutter (Type D-5)	LF	33		
29	Miscellaneous Concrete	LS	1		
30	Full-Depth Reclamation – Cement	SY	2253		
31	Cement (Full-Depth Reclamation – Cement)	TON	95		
~~32~~	~~Earthwork Export~~	~~CY~~	~~94~~	Not Used	Not Used
32	Hot Mix Asphalt (~~HMA~~Type A)	TON	560		
33	Base for AC Pavement - Parking	SF	3650		
34	Base Failure Repair (Digout)	SF	6086		
35	Remove AC Speed Hump	EA	2		
36	Remove AC Pavement	LS	1		
37	AC Speed Hump	EA	2		
38	Crack Sealing	LS	1		
39	Slurry Seal	SY	3747		
40	Bioretention Areas	LS	1		
41	Planting	LS	1		
42	Irrigation	LS	1		
43	Landscaping ~~and~~ Maintenance	LS	1		
44	Storm Drain Manhole	EA	5		
45	12” RCP	LF	1600		
46	Inlet Type GO	EA	1		
47	Overflow Inlet at Bioretention Area	EA	7		
48	Modify Existing Curb Inlet at Bioretention Area No. 8	EA	1		

49	Adjust Sanitary Sewer Manhole Frame and Cover to Grade	EA	1		
50	Reconstruct Sanitary Sewer Utility Lateral	EA	27		
51	Water Service Lateral	EA	16		
52	Abandon Water Service Lateral	EA	16		
53	Adjust Water Valve Box with Cover to Grade	EA	10		
54	Adjust Water Meter Box with Cover to Grade	EA	12		
55	Adjust Telephone ~~Vault~~ Box with Cover to Grade	EA	2		
56	Project Funding Sign	EA	2		
57	Remove Roadside Sign	EA	29		
58	Salvage Pedestrian Barricade w/ Sign	EA	2		
59	Remove Striping, Pavement Markers, and Pavement Markings	LS	1		
60	Thermoplastic Pavement Markings	SF	552		
61	Crosswalk and Limit Line Stripe	SF	1804		
62	Detail 22 Striping	LF	200		
63	Detail 23 Striping	LF	224		
64	Educational Sign	EA	2		
65	Pedestrian Barricade w/ Sign	EA	2		
66	Roadside Sign (Salvaged Sign ~~Panel~~)	EA	29		
67	Replacement Sign ~~Panel~~	EA	20		
68	Two-way Reflective Blue Pavement Markers	EA	7		
				TOTAL BASE BID	

Total Base Bid in Words:

_____

ADDENDUM 4 ATTACHMENT C

Revised Plan Sheet 3,5, and 6

LEGEND:

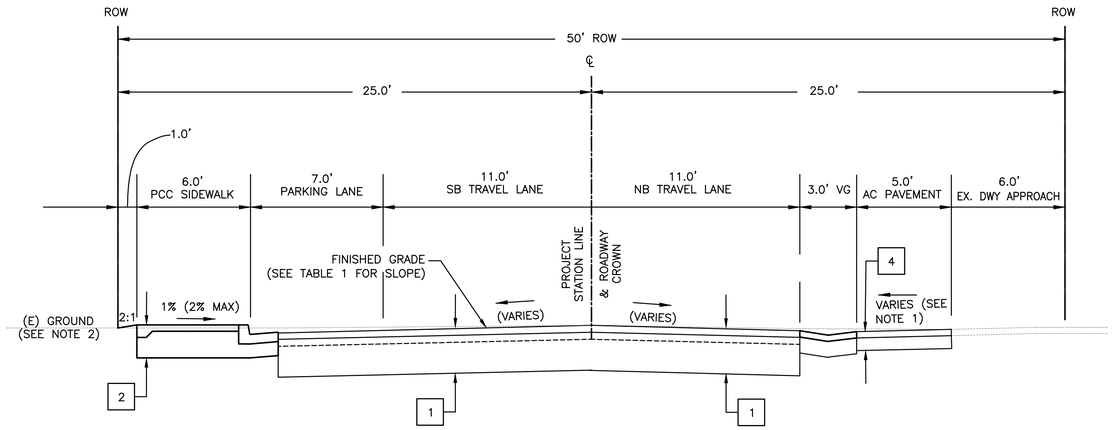
- 1 — 4" HMA (TYPE A) / 15" STABILIZED BASE (FULL DEPTH RECLAMATION) (1)
- 2 — 4" PCC / 4" CLASS 2 AB (95% REL. COMP.)
- 3 — 6" PCC / 6" CLASS 2 AB (95% REL. COMP.)
- 4 — 2" HMA (TYPE A) / 4" CLASS 2 AB (95% REL. COMP.)

CONSTRUCTION NOTES:

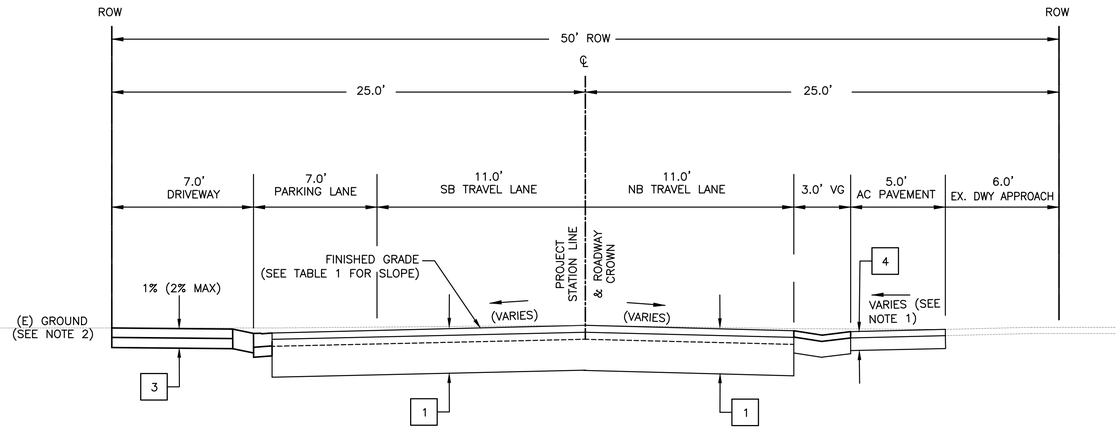
1. CONTRACTOR TO ENSURE THAT A POSITIVE SLOPE IS PROVIDED FROM THE AC PAVEMENT EDGE. ON THE EAST SIDE OF ADDISON AVENUE TO THE VALLEY GUTTER EDGE.
2. CONTRACTOR TO ENSURE THAT DRIVEWAYS ARE CONSTRUCTED WITH A SLOPE TOWARDS THE STREET, SUCH THAT RUNOFF AT THE BACK OF THE DRIVEWAY WILL DRAIN TO THE GUTTER.
3. CONTRACTOR TO CONSTRUCT NEW SIDEWALKS WITH THICKENED SLAB AT THE BACK OF WALK PER DETAIL 6 ON SHEET 19

TABLE 1 – TRAVEL LANE SLOPES (E. BAYSHORE RD. TO GARDEN ST.)

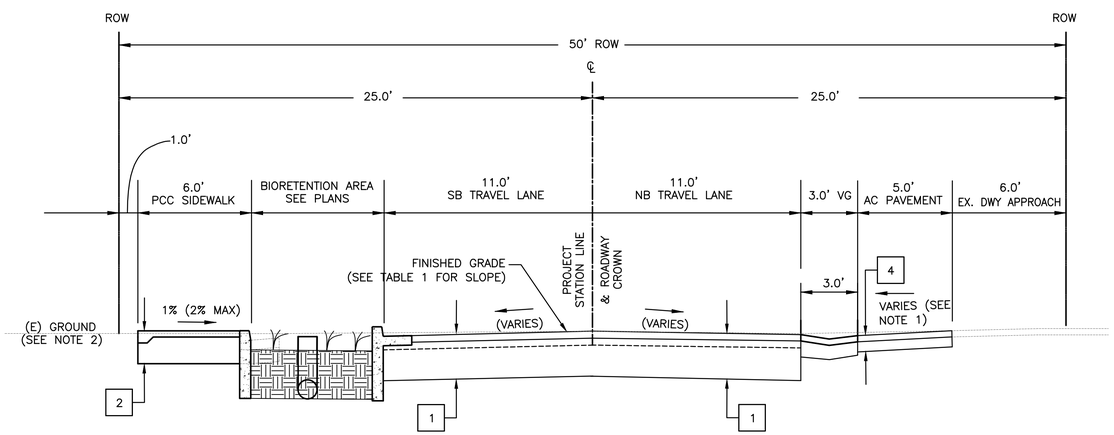
BEGIN STATION	END STATION	SB TRAVEL LANE CROSS SLOPE (%)	NB TRAVEL LANE CROSS SLOPE (%)
10+50	10+60	−0.5	−0.5
10+60	10+85	−1.0	−0.5
10+85	11+10	−1.5	−0.5
11+10	11+40	−2.5	−0.5
11+40	11+60	−3.0	−1.0
11+60	12+40	−5.0	−1.0
12+40	13+00	−5.0	0.5
13+00	13+70	−3.0	1.0
13+70	14+40	−3.0	1.0
14+40	15+25	−3.0	1.0
15+25	16+62	−5.0	1.0
16+62	16+75	−3.0	1.0
16+75	17+50	−5.0	1.0



A — TYPICAL STREET CROSS–SECTION
(ADDISON AVE.– BETWEEN E. BAYSHORE RD. AND GARDEN ST.)
N.T.S.



B — TYPICAL STREET CROSS–SECTION AT DRIVEWAY
(ADDISON AVE.– BETWEEN E. BAYSHORE RD. AND GARDEN ST.)
N.T.S.



C — TYPICAL STREET CROSS–SECTION AT BIORETENTION AREA
(ADDISON AVE.– BETWEEN E. BAYSHORE RD. AND GARDEN ST.)
N.T.S.

Know what's below. Call before you dig.

NO.	REVISIONS	DATE
1	REVISED STRUCTURAL SECTION	3/11/22

DESIGNED BY: CC/KS/LL
DRAWN BY: CC/JL

PREPARED BY:
CSG CONSULTANTS
550 PILGRIM DRIVE
FOSTER CITY, CA 94404
PHONE (650)522-2500
FAX (650)522-2599

TITLE: TYPICAL CROSS-SECTIONS

ADDISON AVENUE SAFE ROUTE TO SCHOOL AND GREEN STREET IMPROVEMENT PROJECT
CITY OF EAST PALO ALTO, CALIFORNIA

SHEET 3 OF 29

DATE: 2/14/2022
JOB NO.: CIP–ST–26

J:\DESIGN\19.358–1_Addison_St_SRTS_Improvements\2022.03.XX_Final_Plan\03_TYPICAL_SECTIONS.dwg 03:40:11 PM

Plotted on: 03/11/22 03:40:11 PM

FOR REDUCED PLANS
ORIGINAL SCALE IS IN INCHES 0 1 2 3

LEGEND:

- FULL DEPTH RECLAMATION (19" MIN BELOW ORIGINAL GRADE). SEE DETAIL A, B, AND C ON SHEET 3 FOR FINISHED STRUCTURAL PAVEMENT SECTIONS AND TRAVEL WAY CROSS SLOPES. REFER TO SPECIFICATIONS. (1)
- REMOVE AND DISPOSE OF AC PAVEMENT.
- REMOVE AND DISPOSE OF PCC SIDEWALK, CURB RAMP, AND CURB AND GUTTER.
- DIGOUT EX. AC PAVEMENT TO TOP OF SUBBASE (5" DEEP MAX).
- GRIND EX. AC HUMP TO FINISHED GRADE.
- TRENCH FOR NEW SD PIPE
- SAWCUT LINE
- (#) DIGOUT NUMBER

CONSTRUCTION NOTES:

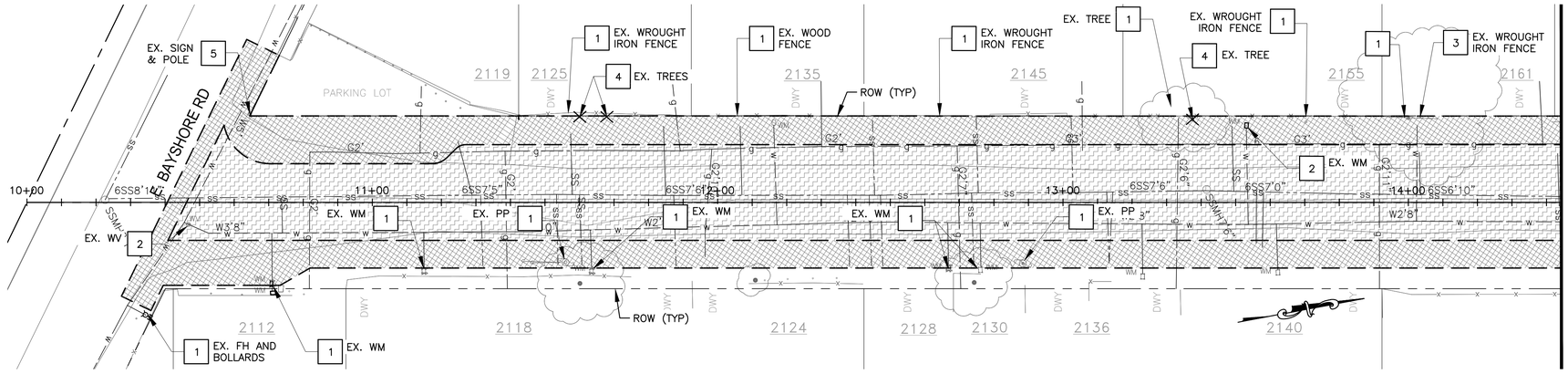
1. PROTECT IN PLACE
2. ADJUST TO GRADE
3. RECONSTRUCT
4. REMOVE
5. REMOVE AND SALVAGE

PAVEMENT DEMOLITION AND IMPROVEMENT NOTES

1. BASE FAILURE REPAIR LOCATIONS WERE MARKED IN THE FIELD AND ARE SHOWN HEREON IN THEIR APPROXIMATE LOCATION. EACH REPAIR LOCATION SHALL BE REVIEWED AND AGREED UPON WITH THE ENGINEER PRIOR TO THE START OF CONSTRUCTION.
2. EXISTING PAVEMENT STRIPES AND MARKINGS SHALL BE REMOVED PRIOR TO SURFACE TREATMENT.
3. MATCH EXISTING CROSS SLOPE AND PROFILE OF THE ROAD, UNLESS OTHERWISE NOTED (EX. E. BAYSHORE ST. TO GARDEN ST.
4. FOR SLURRY SEAL STREET FINISH, DIGOUTS SHALL BE PERFORMED PRIOR TO THE TREATMENT.
5. EACH HMA LIFT SHALL NOT BE PLACED LESS THAN 1.5 INCHES OR MORE THAN 2 INCHES IN COMPACTED THICKNESS. PLACE LIFTS IN EQUAL THICKNESS IF TOTAL REPLACEMENT IS OVER 3 INCHES.
6. CONTRACTOR TO EXERCISE EXTREME CAUTION WHEN WORKING WITHIN LIMITS OF HIGH RISK UNDERGROUND UTILITIES (ELECTRICAL AND GAS).
7. CONTRACTOR TO VERIFY LIMITS OF DEMOLITION WITH LIMITS OF IMPROVEMENTS SHOWN ON IMPROVEMENTS PLAN AND PROFILE, AND LAYOUT AND DETAIL SHEETS, PRIOR TO DEMOLITION WORKS.

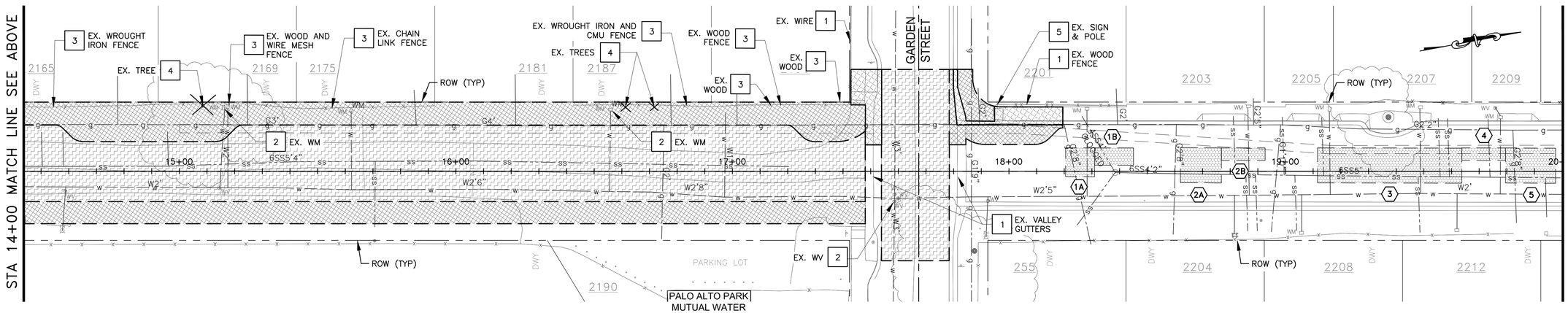
DIGOUT SCHEDULE

DIGOUT NO. (#)	WIDTH (FT)	LENGTH (FT)	AREA (SF)
1A	11	11	121
1B	6	14	84
2A	15	13	195
2B	16	5	80
3	13	52	676
4	5	16	80
5	13	18	234



ADDISON AVENUE

SCALE: 1" = 20'



ADDISON AVENUE

SCALE: 1" = 20'

GRAPHIC SCALE
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Know what's below. Call before you dig.

Plotted on: 03/11/22 @ 03:38:36 PM

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

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NO.	REVISIONS	DATE
1	REVISED STRUCTURAL SECTION	3/11/22

DESIGNED BY: CCK/SLL
DRAWN BY: CC/JL

PREPARED BY:
CSG CONSULTANTS
550 PILGRIM DRIVE
FOSTER CITY, CA 94404
PHONE (650)522-2500
FAX (650)522-2599

TITLE: EXISTING CONDITIONS/DEMOLITION PLAN
STA. 10+00 TO STA. 20+00
ADDISON AVENUE SAFE ROUTE TO SCHOOL AND GREEN STREET IMPROVEMENT PROJECT
CITY OF EAST PALO ALTO, CALIFORNIA

SHEET 5 OF 29

DATE: 2/14/2022
JOB NO. : CIP-ST-26

LEGEND:

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- GRIND EX. AC HUMP TO FINISHED GRADE.
- TRENCH FOR NEW SD PIPE
- SAWCUT LINE
- (#) DIGOUT NUMBER

CONSTRUCTION NOTES:

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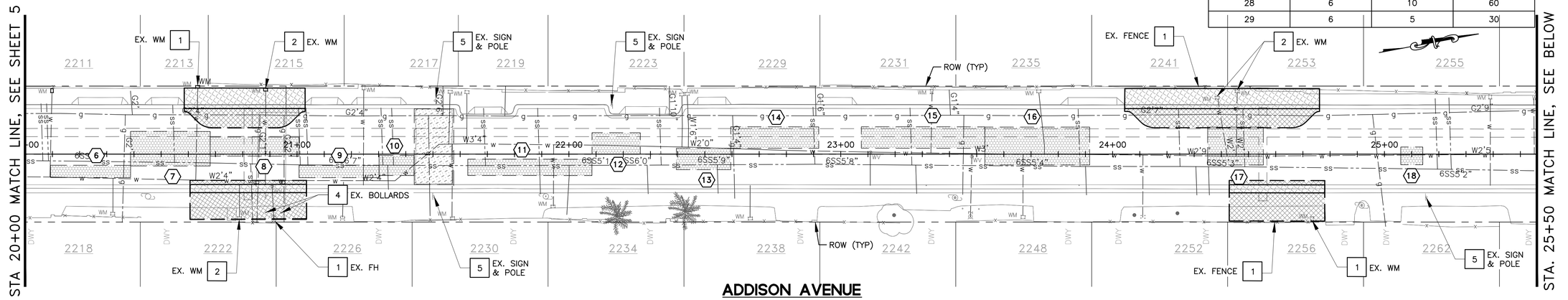
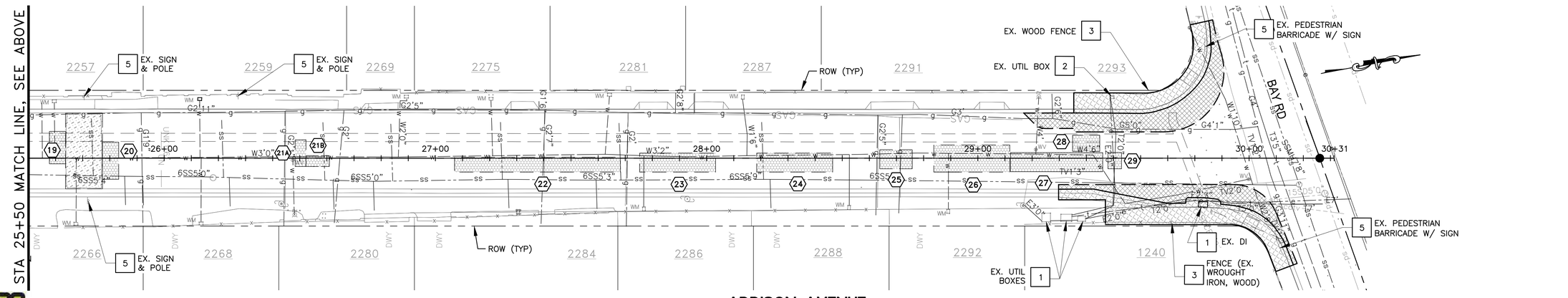
DIGOUT SCHEDULE

DIGOUT NO. (#)	WIDTH (FT)	LENGTH (FT)	AREA (SF)
6	5	30	150
7	13	30	390
8	7	32	224
9	5	30	150
10	8	13	104
11	6	45	270
12	8	18	144
13	8	20	160
14	8	32	256
15	8	45	360
16	14	39	546
17	14	21	294
18	7	8	56
19	12	6	72
20	12	6	72
21A	4	10	40
21B	9	4	36
22	6	61	366
23	7	28	196
24	7	28	196
25	7	12	84
26	10	28	280
27	7	34	238
28	6	10	60
29	6	5	30



ADDISON AVENUE

SCALE: 1" = 20'



ADDISON AVENUE

SCALE: 1" = 20'

GRAPHIC SCALE
20 0 20 40

Know what's below. Call before you dig.

Plotted on: 03/11/22 @ 03:38:51 PM

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FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

NO.	REVISIONS	DATE
1	REVISED STRUCTURAL SECTION	3/11/22

DESIGNED BY: CCK/SLL
DRAWN BY: CC/JL

PREPARED BY:

CSG CONSULTANTS
550 PILGRIM DRIVE
FOSTER CITY, CA 94404
PHONE (650)522-2500
FAX (650)522-2599

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CITY OF EAST PALO ALTO, CALIFORNIA

SHEET 6 OF 29

DATE: 2/14/2022
JOB NO.: CIP-ST-26

ADDENDUM 4 ATTACHMENT D

Preliminary Geotechnical Design Information

PARIKH
Practicing in the Geosciences

MEMORANDUM

To: **CSG Consultants, Inc.**
550 Pilgrim Drive
Foster City, CA 94404

October 14, 2019
Job No. 2019-130-GEO

Attn: Mr. Lawrence Lau, P.E.

From: Y. David Wang, PhD, P.E. 52911

Subject: Preliminary Geotechnical Design Information
Addison Avenue Rehabilitation Project, East Palo Alto, California

This memorandum presents the preliminary geotechnical design information for the Addison Avenue Rehabilitation project in the City of East Palo Alto, CA. The investigation is to help establishment and design of proposed green infrastructure elements such as but not limited to bio-retentions and permeable pavement.

FIELD EXPLORATION AND SUBSOIL CONDITIONS

Field exploration was performed on August 22, 2019. Four borings were explored on existing Addison Avenue with Penhall company (for coring of existing AC) and Pitcher Drilling from East Palo Alto (for drilling hollow stem auger borings). The borehole locations are shown on the Boring Location Plan, Plate 1. The boring logs and pictures of the retrieved AC core are attached with the memo in Appendix A. Laboratory test data are presented in Appendix B.

The borings encountered brown lean clays with natural moisture contents in the range of 15% to 20%. The soil is generally medium stiff in consistency with medium plasticity. The encountered existing pavement sections are as follows:

- B-1: 4” AC, 2” Base rock
- B-2: 2.5” AC, 1.5” Base rock
- B-3: 2.5” AC, 1.5” Base rock
- B-4: 3.5” to 5” AC, 1.5” Base rock

The subgrade clay soils yield low R-values. Two R-values tests were performed on representative samples retrieved from B-1 and B-4. The results show less than 5 for B-1 and 21 for B-4. To account for local irregularity of the subgrade soils, the recommended Design R-value is 5 for the project.

GROUNDWATER CONDITION

Groundwater was encountered at ~15 ft depth in Boring B-4 during drilling. Borings B-1, B-2 and B-3 did not encounter free groundwater within 15 feet depth during drilling. The groundwater level appears to be consistent with the Historically High Groundwater Level provided by California Geologic Survey (Seismic Hazard Report 111), Plate 2.

Note that ground water elevation could significantly vary in the event of a heavy rainfall period or following an El Nino period. Also, ground water may take time to recharge or react to such changes and therefore seasonal fluctuations or the extreme conditions as noted above may or may not affect the ground water immediately following such event. In addition, seasonal fluctuations and impacts from nearby water bodies may impact these elevations. Therefore, it is more important to recognize the potential risk of relying on such transient measurements of groundwater for the design and construction of any underground improvements. It may be prudent to make conservative assumptions in the design and construction program.

PERMEABILITY

Based on discussion with the designer, two permeability tests were performed at the samples retrieved from shallow depth in Borings B-2 and B-4 to provide information on the natural drainage characteristics of the site soils. Since most of the soil encountered at shallow depths on site are clays, the permeability of the soil is expected to be relatively low. Permeability tests were performed in general accordance with ASTM D5084 by Cooper Testing Labs in Palo Alto, California. A summary of permeability test results is presented in the following table. The relatively low values of the permeability are consistent with the clay soil encountered. Based on the data, the on-site soils have very low drainage capability, and the natural infiltration is expected to be limited. When converted to infiltration unit of inches per hour, the data range from 0.0001 in/hr. to 0.028 in/hr. In our experience with some other agencies, the typically required infiltration rate is approx. 0.3 in/hr. in order to consider natural infiltration of native soils.

Permeability Test Results

Boring	Depth (ft)	Soil Classification	Hydraulic Conductivity (K, cm/sec)
B-2	6	Lean Clay	$1x10^{-7}$
B-4	6	Lean Clay	$2x10^{-5}$

PAVEMENT SECTIONS

The Addison Avenue has relatively low traffic volume. The actual design scheme is being discussed between the designer and agency at this time. For preliminary information, we have assumed a Design Traffic Index (TI) of 5 with subgrade R value of 5. The City should verify the Design TI for final design, and the sections should be updated as necessary. Since the subgrade consists of expansive clays, it is recommended that the pavement subgrade be over-excavated and replace with minimum 12 inches of Aggregate Subbase over a layer of geotextile enhancement fabric. Based on the above, the following pavement section is provided for preliminary purpose:

3" Dense Graded HMA
10" Aggregate Base (AB Class 2)
12" Aggregate Subbase (AS Class 2, over geotextile fabric)

The HMA, Aggregate Base and Aggregate Subbase should conform to Caltrans Standard Specifications (2015). The subgrade enhancement geotextile fabric should conform to Section 96-1.02O (Class B1) of Caltrans Standard Specifications.

PERMEABLE PAVER

Based on preliminary information provided, the project may have to consider the use of permeable paver to improved site drainage. Detailed design plan is still been evaluated. The discussion here with Permeable Interlocking Concrete Pavement (PICP) is intended to provide a preliminary concept for the designer. PICP has seen typical usage for such purpose.

PICP consists of solid concrete paving units with joints that create openings in the surface when assembled into a pattern. The joints are filled with permeable aggregates that allow water to freely enter the surface. The boring data indicated that the site soils at shallow depths are clayey with relatively low infiltration rate. The native soil does not percolate well.

For such condition, the sections typically include Open-Graded Base Reservoir and Open-Graded Subbase Reservoir to increase water-storage spaces among the stones, and the system incorporates drainage pipes. The open-graded Base and Subbase are encapsulated in filter fabric to prevent migration of soil fines. Please refer to the Tech Brief, "Permeable Interlocking Concrete Pavement (FHWA HIF-19-021) for further detail. Per the publication, the application is

suitable for low-speed roads and road shoulders (Caltrans Traffic Index <9), which is applicable to Addison Avenue.

NOTES TO DESIGNERS

Near-surface soils can vary significantly. Contingency plans should be considered in the event unanticipated conditions are encountered. Local areas may require over-excavation to attain firm subgrade conditions.

There are vegetation areas within the proposed roadway therefore wet pavement subgrade may be encountered during construction. In the event wet subgrade is encountered, subgrade stabilization measures such as use of subgrade enhancement fabric (SEG) should be considered. It may be prudent to have these items included as a unit bid item.

The designer or the contractor should verify if there is potential utility conflict. The earth work should follow the city and Caltrans' Standards.

INVESTIGATION LIMITATIONS

Our services consist of professional opinions and recommendations made in accordance with generally accepted geotechnical engineering principles and practices. No warranty, expressed or implied, of merchantability or fitness, is made or intended in connection with our work or by the furnishing of oral or written reports or findings. The scope of our services did not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in structures, soil, surface water, groundwater or air, below or around this site.

This memorandum has been prepared for the proposed project as described earlier, to assist the engineer in the design of this project. In the event any changes in the design or location of the facilities are planned, or if any variations or undesirable conditions are encountered during construction, our conclusions and recommendations shall not be considered valid unless the changes or variations are reviewed and our recommendations modified or approved by us in writing.

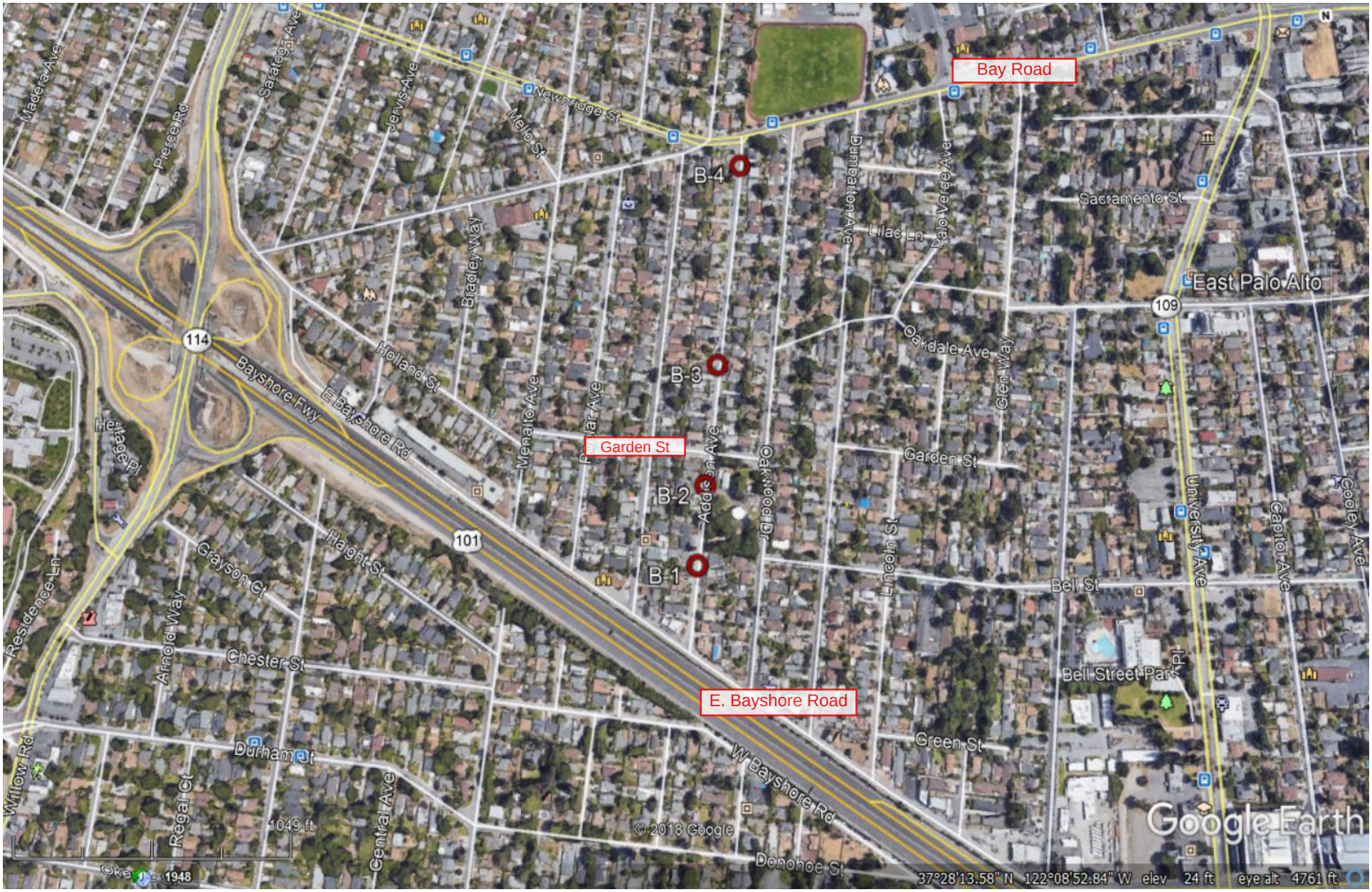
This memorandum is issued with the understanding that it is the designer's responsibility to ensure that the information and recommendations contained herein are incorporated into the

project and that necessary steps are also taken to see that the recommendations are carried out in the field.

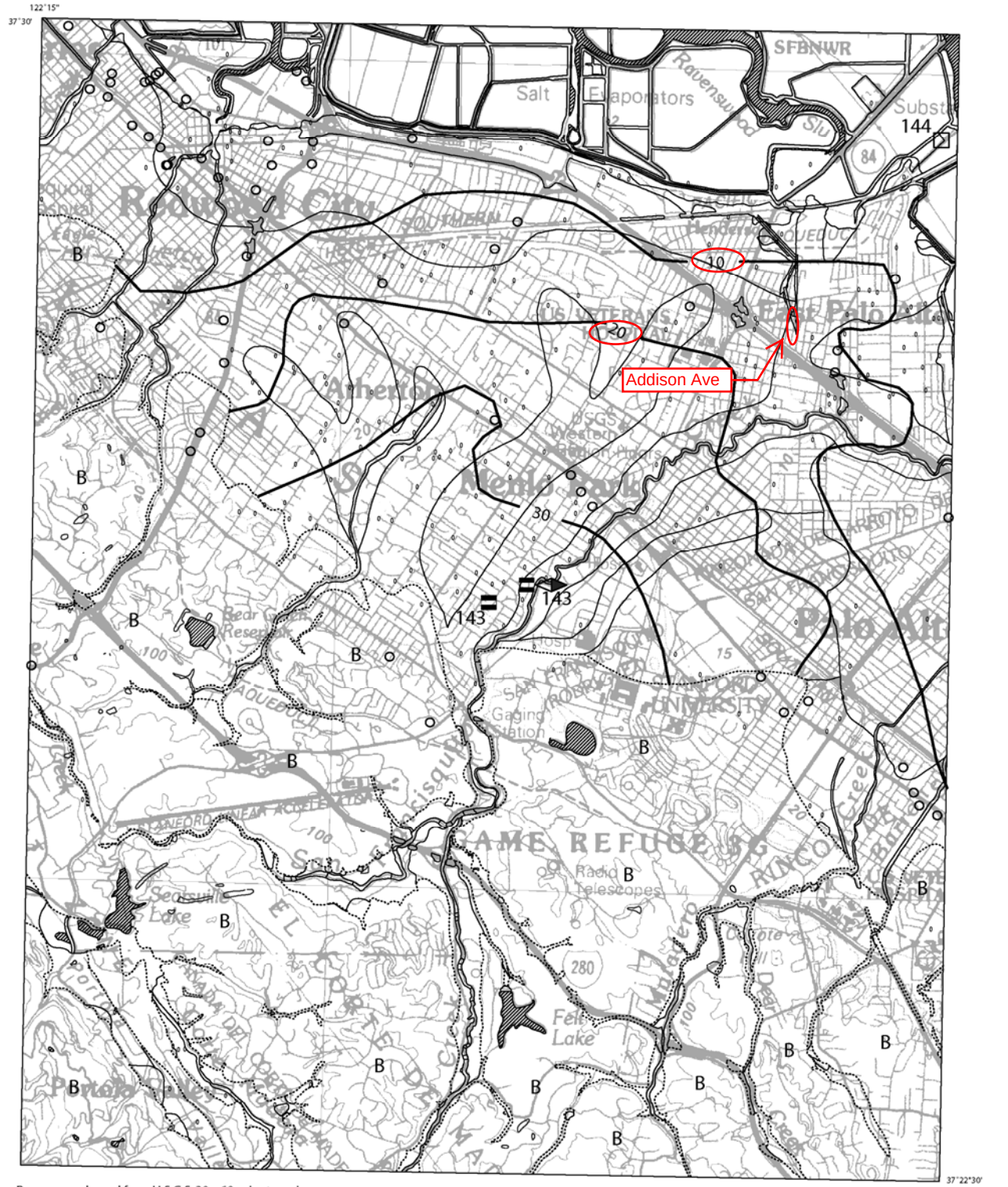
The findings in this memorandum are valid as of the present date. However, changes in the subsurface conditions can occur with the passage of time, whether they are due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or from the broadening of knowledge. Accordingly, the findings in this memorandum might be invalidated, wholly or partially, by changes outside of our control.

Attachments:

- Boring Location Plan, Plate 1
- Historically High Groundwater Contour, Plate 2
- Appendix A - Logs of Soil Borings and Pictures of AC Cores
- Appendix B – Laboratory Test Results
- Appendix C – Pavement Design



Boring Location Map, Plate 1
Addison Avenue Rehabilitation Project
City of East Palo Alto, CA



Base map enlarged from U.S.G.S. 30 x 60-minute series
Historical Ground Failures (From Knudsen and others, 2000)

PALO ALTO QUADRANGLE

SCALE

Absence of ground failure noted

Ground cracks not clearly associated with landslide, lateral spread, settlement, or primary movement

Lateral spread

B Bedrock

Bedrock- Quaternary boundary

152 Number assigned to ground failure site (adapted from Youd and Hoose, 1978; and Tinsley and others,1998; by Knudsen and others, 2000)

Water Body

10 Depth to ground water, in feet

Geotechnical borings used in liquefaction evaluation

Ground-water level data provided by the State Water Resources Control Board.

Plate 1.2 Depth to historically high ground water, and locations of boreholes used in this study, Palo Alto 7.5-minute Quadrangle, California

APPENDIX A

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
El. Bhangoo	**8-22-19**	**8-22-19**		**B-1**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Pitcher Drilling Company				
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Hollow-Stem Auger			**CME 55**	**8 in**
SAMPLER TYPE(S) AND SIZE(S) ID			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC			**Auto 140 lbs / 30 inches**	
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Cement Grout			**Not encountered**	**16.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT CONCRETE 4", AGGREGATE BASE 2".												
	1		Lean CLAY (CL); medium stiff; brown; moist.												
	2				1	2 4 7	11				100				
	3		(LL=37, PI=17).					18	112						PI
	4														
	5				2	2 5 8	13				100				
	6							17	98						
	7														
	8														
	9														
	10				3	2 3 7	10				100				
	11							22	101						
	12														
	13														
	14														
	15				4	2 5 9	14				100				
	16							23	103						
	17		Bottom of borehole at 16.5 ft bgs												
	18		No free groundwater was encountered during drilling												
	19		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2010) except as noted on the Soil or Rock Legend or below.												
	20														
	21														
	22														
	23														
	24														
	25														

LOG OF TEST BORING

PARIKH Practicing in the Geosciences

ADDISON AVE REHABILITATION

EAST PALO ALTO, CALIFORNIA

Date: | Boring ID: B-1 | Job No.: 2019-130-GEO

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate: A-

PCI-CT 5 BR 2019-130-GEO.GPJ TEMPLATE 7-22-11.GDT 10/11/19

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
El. Bhangoo	**8-22-19**	**8-22-19**		**B-2**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Pitcher Drilling Company				
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Hollow-Stem Auger			**CME 55**	**8 in**
SAMPLER TYPE(S) AND SIZE(S) ID			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC			**Auto 140 lbs / 30 inches**	
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Cement Grout			**Not encountered**	**16.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT CONCRETE 2.5", AGGREGATE BASE 1.5".												
	1		Lean CLAY (CL); medium stiff; brown; moist.												
	2				1	2 3 4	7				100				
	3		(LL=39, PI=20).												PI, R
	4														
	5		Dark brown.												
	6				2	2 5 7	12	18	98		100				
	7														
	8														
	9		Brown.												
	10														
	11				3	2 4 7	11	20	97		100				
	12														
	13														
	14														
	15														
	16				4	1 2 4	6	22	105		100				
	17		Bottom of borehole at 16.5 ft bgs												
	18		No free groundwater was encountered during drilling												
	19		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2010) except as noted on the Soil or Rock Legend or below.												
	20														
	21														
	22														
	23														
	24														
	25														

LOG OF TEST BORING

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ADDISON AVE REHABILITATION

EAST PALO ALTO, CALIFORNIA

Date: | Boring ID: B-2 | Job No.: 2019-130-GEO

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate: A-

PCI-CT 5 BR 2019-130-GEO.GPJ TEMPLATE 7-22-11.GDT 10/11/19

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
El. Bhangoo	**8-22-19**	**8-22-19**		**B-3**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Pitcher Drilling Company				
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Hollow-Stem Auger			**CME 55**	**8 in**
SAMPLER TYPE(S) AND SIZE(S) ID			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC			**Auto 140 lbs / 30 inches**	
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Cement Grout			**Not encountered**	**16.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT CONCRETE 2.5", AGGREGATE BASE 1.5".												
	1		Lean CLAY (CL); medium stiff; dark brown; moist.												
	2				1	1 4 8	12	18	51		100				PI
	3		(LL=37, PI=19).												
	4														
	5				2	3 7 10	17	10	101	0.85	100				UC
	6		Pockets of Sand; UC=1.7 tsf.												
	7														
	8		Brown.												
	9														
	10				3	3 4 7	11	18	106		100				
	11														
	12														
	13														
	14														
	15				4	2 3 6	9	24	97		100				
	16														
	17		Bottom of borehole at 16.5 ft bgs												
	18		No free groundwater was encountered during drilling												
	19		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2010) except as noted on the Soil or Rock Legend or below.												
	20														
	21														
	22														
	23														
	24														
	25														

LOG OF TEST BORING

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Practicing in the Geosciences

ADDISON AVE REHABILITATION

EAST PALO ALTO, CALIFORNIA

Date: | Boring ID: B-3 | Job No.: 2019-130-GEO

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate: A-

PCI-CT 5 BR 2019-130-GEO.GPJ TEMPLATE 7-22-11.GDT 10/11/19

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
El. Bhangoo	**8-22-19**	**8-22-19**		**B-4**
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Pitcher Drilling Company				
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Hollow-Stem Auger			**CME 55**	**8 in**
SAMPLER TYPE(S) AND SIZE(S) ID			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
MC			**Auto 140 lbs / 30 inches**	
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING **15.0 ft** AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
Cement Grout				**16.5 ft**

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Depth	Sample Number	Blows per 6 in.	Blows per foot	Moisture Content (%)	Dry Unit Weight (pcf)	UC/UU in Shear. Str. (tsf)	Recovery (%)	RQD (%)	Drilling Method	Casing Depth	Remarks
	0		ASPHALT CONCRETE 3.5 " to 5", AGGREGATE BASE 1.5".												
	1		Lean CLAY (CL); medium stiff; dark brown; moist.												
	2				1	3 5 8	13				100				R
	3														
	4														
	5				2	4 5 8	13	16	111		100				
	6														
	7														
	8														
	9														
	10		Trace fine GRAVEL.		3	3 6 9	15	19	101		100				
	11														
	12														
	13														
	14		SILTY SAND with GRAVEL (SM); medium dense; brown to gray; wet.												
	15				4	5 9 13	22	14			72				
	16		(+#4=32.8%; -#200=7.2%).												PA
	17		Bottom of borehole at 16.5 ft bgs												
	18		Groundwater was encountered at 15 feet during drilling. Boring backfilled with cement grout.												
	19		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2010) except as noted on the Soil or Rock Legend or below.												
	20														
	21														
	22														
	23														
	24														
	25														

LOG OF TEST BORING

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ADDISON AVE REHABILITATION

EAST PALO ALTO, CALIFORNIA

Date: | Boring ID: B-4 | Job No.: 2019-130-GEO

This log is part of the report prepared by Parikh Consultants, Inc. for the named project and should be read together with that report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.

Plate: A-

PCI-CT 5 BR 2019-130-GEO.GPJ TEMPLATE 7-22-11.GDT 10/11/19

2019-130-GEO
Addison Avenue, East Palo Alto
Boring B-1

BORING- B-1

PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS TESTING	**ADDISON AVENUE REHABILITATION PROJECT** **CITY OF EAST PALO ALTO, CALIFORNIA**		
	JOB NO.: 2019-130-GEO	**PLATE NO.:**	

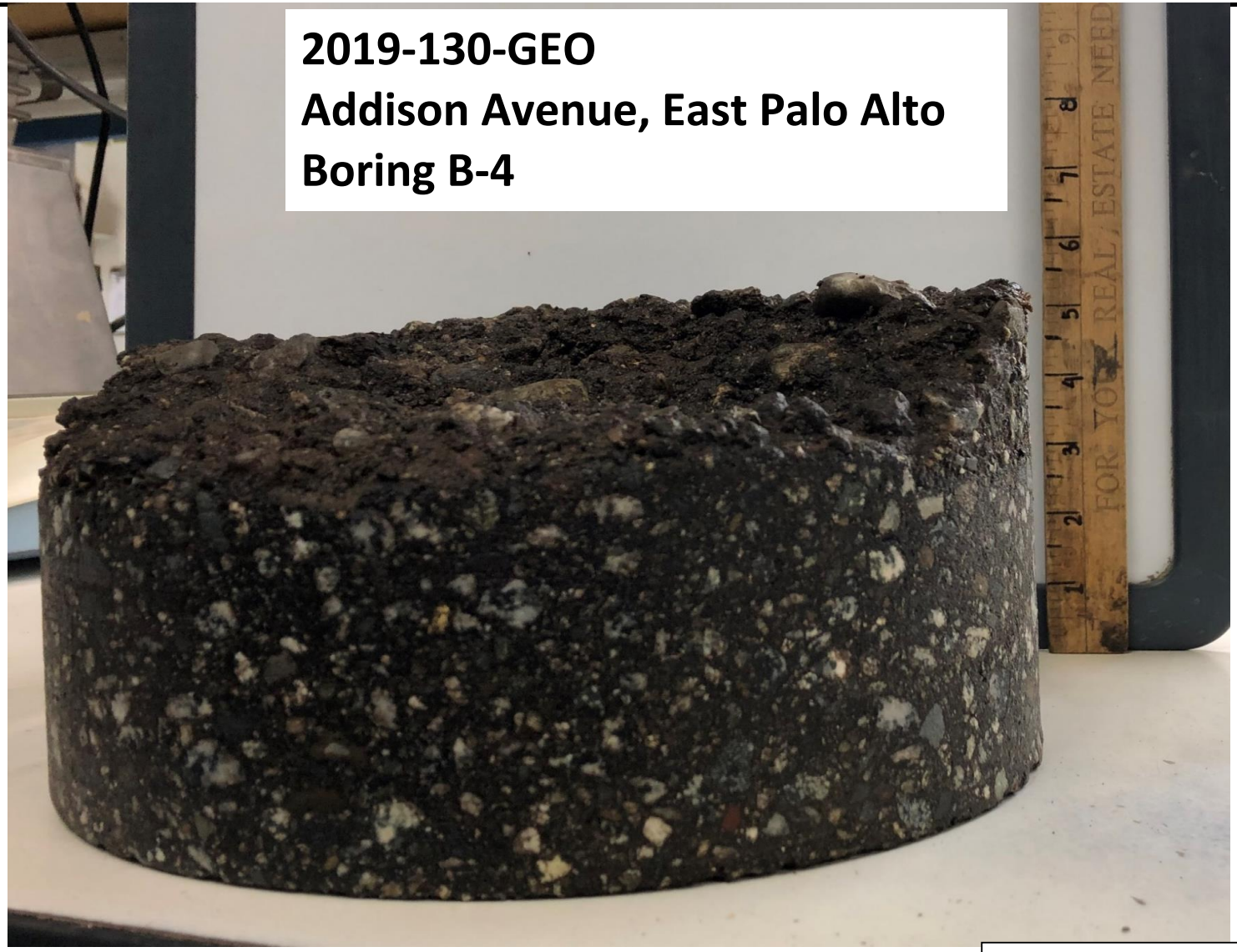
BORING- B-2

PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS TESTING	**ADDISON AVE REHABILITATIN PROJECT** **CITY OF EAST PALO ALTO, CALIFORNIA**	
JOB NO.: 2019-130-GEO	**PLATE NO.:**	

BORING- B-3

PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS TESTING	**ADDISON AVENUE REHABILITATION PROJECT** **CITY OF EAST PALO ALTO, CALIFORNIA**		
	JOB NO.: 2019-130-GEO	**PLATE NO.:**	

2019-130-GEO
Addison Avenue, East Palo Alto
Boring B-4

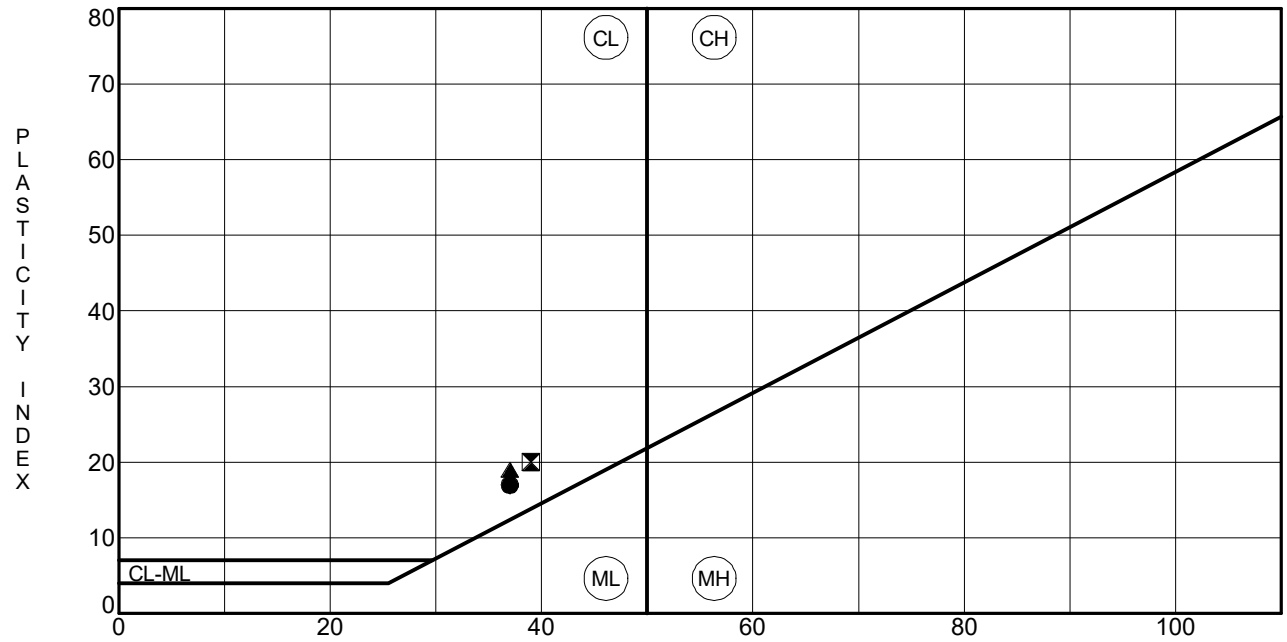


BORING- B-4

PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS TESTING	**ADDISON AVENUE REHABILITATION PROJECT** **CITY OF EAST PALO ALTO, CALIFORNIA**		
	JOB NO.: 2019-130-GEO	**PLATE NO.:**	

APPENDIX B

Borehole	Sample Number	Depth	Classi-fication	Water Content	Dry Density	Liquid Limit	Plastic Limit	Plasticity Index	% > Sieve 4	% < Sieve 200	Unconfined Shear Strength (tsf)
B-1	1	3.0	CL	17.8	112.1	37	20	17			
B-1	2	6.0	CL	16.9	98.4						
B-1	3	11.0	CL	22.0	101.1						
B-1	4	16.0	CL	22.6	102.5						
B-2	1	3.0	CL	-	-	39	19	20			
B-2	2	6.0	CL	18.2	97.9						
B-2	3	11.0	CL	19.8	96.9						
B-2	4	16.0	CL	22.3	104.7						
B-3	1	3.0	CL	17.5	51.5	37	18	19			
B-3	2	6.0	CL	10.1	100.8						0.85
B-3	3	11.0	CL	17.6	106.0						
B-3	4	16.0	CL	24.3	96.6						
B-4	1	3.0	CL	-	-						
B-4	2	6.0	CL	16.1	110.8						
B-4	3	11.0	CL	18.6	101.2						
B-4	4	16.0	SM	14.1	-				32.8	7.2	



PLASTICITY

	BOREHOLE	SAMPLE #	DEPTH	LL	PL	PI	Fines	Classification
●	**B-1**	**1**	**3.0**	**37**	**20**	**17**		**Lean CLAY**
⧓	**B-2**	**1**	**3.0**	**39**	**19**	**20**		**Lean CLAY**
▲	**B-3**	**1**	**3.0**	**37**	**18**	**19**		**Lean CLAY**

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ADDISON AVE REHABILITATION
EAST PALO ALTO, CALIFORNIA

JOB NO: 2019-130-GEO | **PLATE NO: B-2**

Hydraulic Conductivity
ASTM D 5084
Method C: Falling Head Rising Tailwater

Job No:	157-373	**Boring:**	B-2	**Date:**	09/20/19
Client:	Parikh Consultants	**Sample:**		**By:**	MD/PJ
Project:	2019-130-GEO	**Depth, ft.:**	6	**Remolded:**	

Visual Classification: Dark Gray CLAY w/ Sand

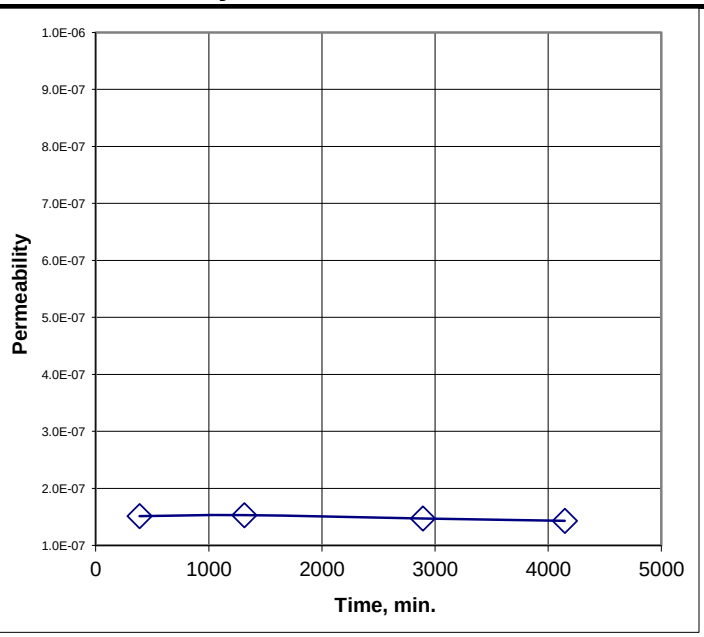
Max Sample Pressures, psi:

Cell:	Bottom	Top	Avg. Sigma3
63.5	59	58	5

B: = >0.95 **("B" is an indication of saturation)**

Max Hydraulic Gradient: = 13

Date	Minutes	Head, (cm)	K,cm/sec
9/11/2019	0.00	97.33	Start of Test
9/11/2019	388.00	94.33	1.5E-07
9/12/2019	1315.00	87.53	1.5E-07
9/13/2019	2892.00	77.73	1.5E-07
9/14/2019	4146.00	70.93	1.4E-07



Average Hydraulic Conductivity: **1.E-07** **cm/sec**

Sample Data:	Initial (As-Received)		Final (At-Test)
Height, in	3.05		3.04
Diameter, in	2.39		2.41
Area, in2	4.48		4.54
Volume in3	13.66		13.81
Total Volume, cc	223.8		226.3
Volume Solids, cc	132.0		132.0
Volume Voids, cc	91.9		94.3
Void Ratio	0.7		0.7
Total Porosity, %	41.0		41.7
Air-Filled Porosity (θa),%	9.6		1.4
Water-Filled Porosity (θw),%	31.5		40.3
Saturation, %	76.7		96.6
Specific Gravity	2.70	Assumed	2.70
Wet Weight, gm	426.7		447.4
Dry Weight, gm	356.3		356.3
Tare, gm	0.00		0.00
Moisture, %	19.8		25.6
Wet Bulk Density, pcf	119.0		123.4
Dry Bulk Density, pcf	99.3		98.2
Wet Bulk Dens.ρb, (g/cm^3)	1.91		1.98
Dry Bulk Dens.ρb, (g/cm^3)	1.59		1.57

Remarks:

Hydraulic Conductivity
ASTM D 5084
Method C: Falling Head Rising Tailwater

Job No:	157-373	**Boring:**	B-4	**Date:**	09/09/19
Client:	Parikh Consultants	**Sample:**		**By:**	MD/PJ
Project:	2019-130-GEO	**Depth, ft.:**	6	**Remolded:**	

Visual Classification: Dark Brown Sandy CLAY/ CLAY w/ Sand

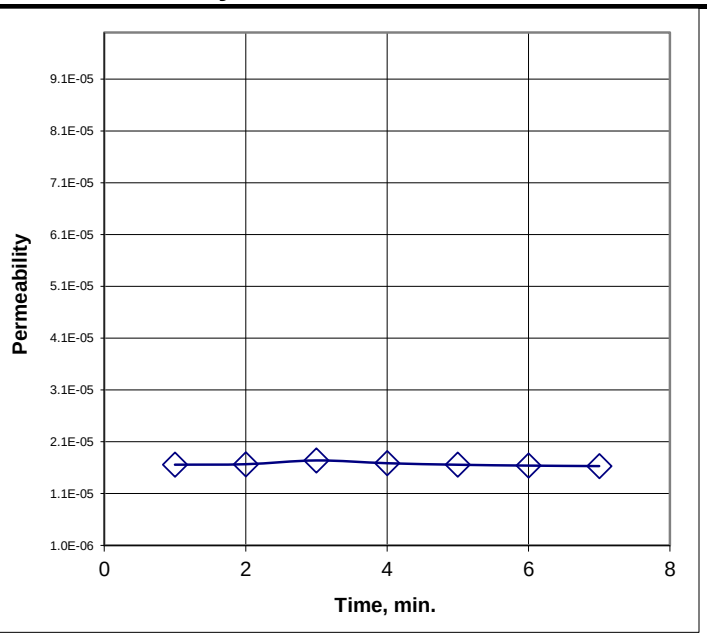
Max Sample Pressures, psi:

Cell:	Bottom	Top	Avg. Sigma3
74	69.5	68.5	5

B: = >0.95 **("B" is an indication of saturation)**

Max Hydraulic Gradient: = 14

Date	Minutes	Head, (in)	K,cm/sec
9/6/2019	0.00	41.04	**Start of Test**
9/6/2019	1.00	40.59	1.7E-05
9/6/2019	2.00	40.14	1.7E-05
9/6/2019	3.00	39.64	1.7E-05
9/6/2019	4.00	39.24	1.7E-05
9/6/2019	5.00	38.84	1.7E-05
9/6/2019	6.00	38.44	1.6E-05
9/6/2019	7.00	38.04	1.6E-05



Average Hydraulic Conductivity: 2.E-05 cm/sec

Sample Data:	Initial (As-Received)		Final (At-Test)
Height, in	3.07		3.04
Diameter, in	2.39		2.38
Area, in2	4.49		4.43
Volume in3	13.78		13.47
Total Volume, cc	225.8		220.7
Volume Solids, cc	131.4		131.4
Volume Voids, cc	94.4		89.3
Void Ratio	0.7		0.7
Total Porosity, %	41.8		40.5
Air-Filled Porosity (θa),%	22.9		1.9
Water-Filled Porosity (θw),%	18.9		38.6
Saturation, %	45.1		95.4
Specific Gravity	2.70	Assumed	2.70
Wet Weight, gm	397.4		440.0
Dry Weight, gm	354.8		354.8
Tare, gm	0.00		0.00
Moisture, %	12.0		24.0
Wet Bulk Density, pcf	109.8		124.4
Dry Bulk Density, pcf	98.1		100.3
Wet Bulk Dens.ρb, (g/cm^3)	1.76		1.99
Dry Bulk Dens.ρb, (g/cm^3)	1.57		1.61

Remarks:

APPENDIX C

PAVEMENT DESIGN

PER HIGHWAY DESIGN MANUAL, CHAP. 600

PROJECT NAME: *Addison Avenue Rehabilitation*
PROJECT NO.: *2019-130-GEO*

Design Case: AC over AB

Design TI= ***5***
R_{BS}= ***5*** (Expansive clayey subgrade. Use extra AS over geotextile fabric)
R_{AB}= 78

$GE_{AC+AB} = 0.0032*TI*(100-R_{BS}) =$ 1.52

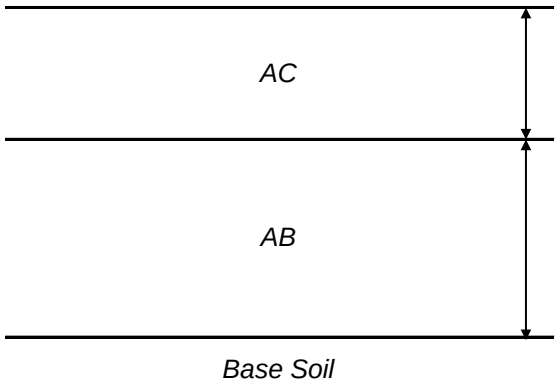
$GE_{AC} = 0.0032*TI*(100-R_{AB}) =$ 0.35
=> GE'_{AC} = 0.55 (add 0.2 ft safety factor)
AC Thickness = 0.22 ft

=> AC Thickness = **0.25** ft (round up to the nearest 0.05 ft)
$G_{f, AC}$ = 2.54
GE_{AC} = 0.63

$GE_{AB} = GE_{AC+AB} - GE_{AC} =$ 0.89
AB thickness= 0.81 ft

=> AB Thickness= **0.85** ft (round up to the nearest 0.05 ft)
GE_{AB}= 0.94 $G_{f, AB}$=1.1

Design Section:



Due to expansive clay at site, use 12 inches Aggregate Subbase (AS, Class 2) over a layer of geotextile enhancement fabric at subgrade.
Recommended Pavement Sections:
3" HMA, 10" AB over 12" AS over geotextile fabric for assumed TI of 5. The city should verify the Design TI.

ADDENDUM 4 ATTACHMENT E

Revised Technical Specifications

TECHNICAL SPECIFICATIONS

CITY PROJECT NO. ST-26

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SECTION 100

DEFINITION OF BID ITEMS

PART 1 – GENERAL

The bid item descriptions listed in the Bid Schedule of the proposal are not intended to be exclusive and comprehensive descriptions of all the work categories and scope necessary to complete the project. As such, the Contractor shall determine, segregate and include in his/her pricing for each bid item the cost for furnishing and installing all labor, materials, tools, equipment and other incidentals necessary to complete all of the contract work involved in the project, as described by the Contract Documents, complete in place.

Unless otherwise noted, estimated quantities on the bid schedule are believed to be accurate, however, the Contractor should self-verify the quantities as it relates to ordering sufficient material and scheduling work. Actual field measured quantities, complete in place, not the quantities listed in the bid schedule, will govern final payment.

PART 2 - BID ITEM DESCRIPTIONS

2.01 Mobilization. The contract price paid for Mobilization includes full compensation for the work required and necessary for Mobilization specified in Technical Specifications Section 102, “Mobilization”.

Mobilization will be paid by lump sum in accordance with the California Public Contract Code Section 10264. The contract lump sum price for Mobilization shall not exceed five percent (5%) of the total base bid. Any amount excess of 5% of the total base bid shall be paid as part of the final payment.

2.02 Progress Schedule (Critical Path Method). The contract price paid for Progress Schedule (Critical Path Method) includes full compensation for the work required and necessary to perform the progress schedule work specified in Technical Specifications Section 101, “General Requirements,” including all necessary submittals.

Progress Schedule (Critical Path Method) will be paid by lump sum. Contractor will be due 33% of the contract price for Progress Schedule (Critical Path Method) after the approval of the baseline schedule. The remainder of the contract price will be evenly divided over the remaining progress payments.

2.03 Traffic Control. The contract price paid for Traffic Control includes full compensation for work required to implement and perform traffic control as specified in Technical Specifications Section 103, “Traffic Control”, including all necessary submittals, materials, implementation, and maintenance of the approved traffic control plans for all work in construction zones throughout the duration of the project.

Traffic Control will be paid by lump sum. Progress payments will be based on the percentage of traffic control work completed.

2.04 Stormwater Pollution Prevention. The contract price paid for Stormwater Pollution Prevention includes full compensation for performing the work required and necessary to implement and perform Stormwater Pollution Prevention as specified in Section 104, “Stormwater Pollution Prevention” of these Technical Specifications. The contract price shall include performing all the work necessary to prepare and implementing the Water Pollution Control Plan, and furnish, install and maintain all best management practices for the duration of the project in accordance with City and State standards, and as directed by the Engineer. This work includes all construction activities necessary to prevent construction dust and debris from leaving the site, including entering the storm drain system. The work includes furnishing, installing, and maintaining temporary drainage inlet protection and fiber rolls; street sweeping; and removing dirt, debris, and materials from the site at the completion of the project.

Stormwater Pollution Prevention will be paid by lump sum. Progress payments will be based on the percentage of stormwater pollution prevention completed.

2.05 Construction Staking and Surveying. The contract price paid for Construction Staking and Surveying includes full compensation for the work required and necessary for construction staking and surveying work specified in Technical Specifications Section 101, "General Requirements", including submittals.

Construction Staking and Surveying will be paid by lump sum. Progress payments will be based on the percentage of construction staking and surveying completed.

2.06 Utility Potholing – Design. The contract price for paid for "Utility Potholing – Design" includes full compensation for the work required and necessary to perform the Utility Potholing - Design specified in Technical Specifications and shown on the plans," including submittals, working drawings, and construction staking and surveying.

Utility Potholing – Design will be paid by each. Progress payments will be paid for a pothole after the pothole is backfilled to the satisfaction of the Engineer and required pothole data is provided to the Engineer.

2.07 General Utility Potholing. The contract price for paid for General Utility Potholing includes full compensation for the required and necessary general utility potholing work specified in Technical Specifications Section 101, "General Requirements."

General Utility Potholing will be paid by lump sum. Progress payments will be based on the percentage of general utility potholing completed.

2.08 Reconstruct Fence (Address) or Reconstruction Fence and Gate(s) (Address). The contract price paid for "Reconstruct Fence" and "Reconstruct Fence and Gates(s)," includes full compensation for the required and necessary reconstruct fence and/or gate work specified in Technical Specifications Section 101, "General Requirements" and shown on the plans, including surveying, dismantling existing fence and gates, removing fence posts and foundations, reconstructing the fence including incorporating new material into the work, as required.

Reconstruct Fence and "Reconstruct Fence and Gate(s) will be paid by linear foot for the reconstructed fence and gate(s). The linear foot measurement includes gates. No separate measurement or payment will be made for a gate or gates. Progress payments will be based on the percentage of fence and/or gate reconstruction completed.

2.16 Remove and Trim Trees. The contract price for "Remove and Trim Trees" includes full compensation for the required and necessary remove and trim trees work specified in Technical Specifications Section 101, "General Requirements," and shown on the plans, including surveying, removing roots, and removing branches generated from trimming.

Remove and Trim Trees will be paid by lump sum. Progress payments will be based on the percentage of removing and trimming trees completed. Not less than twenty percent of the contract price will be paid after tree trimming above the new sidewalks is completed.

2.17 Remove Concrete. The contract price for "Remove Concrete" includes full compensation for required and necessary concrete removal work specified in Technical Specifications Section 105, "Concrete Improvements," and shown on the plans, including saw cutting.

Sidewalk is removed to score lines so more concrete removal may be required at the existing sidewalk than shown on the plans. No additional compensation is allowed for removing sidewalk to the score line.

Remove concrete will be paid by lump sum. Progress payments will be based on the percentage of concrete removal completed.

2.18 Cut-off Curb (Type 1). The contract price for "Concrete Curb (Type 1) includes full compensation

for required and necessary cut-off curb (Type 1) work specified in the Technical Specifications Section 105, “Concrete Improvements” and shown on the plans including saw cutting removing concrete and asphalt, excavating, and forming block out openings in formwork for existing or future utilizes and working drawings.

Cut-off curb (Type 1) shall be paid by linear foot measured at the top of the curb. Progress payments will be based on the percentage of cut-off curb (Type 1) work completed.

2.19 Cut-off Curb (Type 2). The contract price for “Concrete Curb (Type 2) includes full compensation for required and necessary cut-off curb (type 2) work specified in the Technical Specifications Section 105, “Concrete Improvements” and shown on the plans, including saw cutting, removing concrete and asphalt, excavating, and forming openings in formwork for existing or future utilizes and working drawings.

Cut-off curb (Type 2) shall be paid by linear foot measured at the top of the curb. Progress payments will be based on the percentage of cut-off curb (Type 2) work completed. The transition curb behind the cut-off curb will be paid as “Concrete Sidewalk.”

2.20 Concrete Curb Ramp. The contract price paid for “Concrete Curb Ramps w/ Detectible Warning Band” includes full compensation for required and necessary concrete curb ramp work specified in the Technical Specification, shown of the plans, and Caltrans Standard details, including ramp, retaining curbs, detectable warning surface, curb and gutter.

Concrete curb ramp will be paid by each. Progress payments will be paid based on the concrete curb ramp complete in place.

Only ramps with detectible warning bands will be paid under this item. Ramps without detectible warning bands with be paid under sidewalk.

2.21 Concrete Curb and Gutter. The contract price paid for “Concrete Curb and Gutter” includes full compensation for required and necessary concrete curb and gutter work specified in the Technical Specifications and shown on the plans.

Concrete curb and gutter will be paid by linear feet. Progress payments will be paid based on the concrete curb ramp complete in place.

2.22 Concrete Sidewalk. The contract price for “Concrete Sidewalk” includes full compensation for the required and necessary concrete sidewalk work as specified in the Technical Specifications Section 105, “Concrete Improvements” and shown on the plans including grading, preparing subgrade, constructing thickened slab at back of sidewalk and conforming to existing grade at back of walk.

Concrete sidewalk will be paid by square foot. Progress payments will be paid based on the square feet on concrete sidewalk complete in place.

Concrete sidewalk is more specifically described as the sidewalk behind bioretention areas and the sidewalk between the expansion joints at the concrete curb ramps, not including concrete for concrete curb ramps.

2.23 Urban Curb, Gutter, and Sidewalk (Type D-3). The contract price for paid for “Urban Curb, Gutter, and Sidewalk (Type D-3)” includes full compensation for the required and necessary urban curb, gutter, and sidewalk (type D-3) work specified in the Technical Specification Section 105, “Concrete Improvements” and shown on the plans, including grading, preparing subgrade, thickened slab at back of sidewalk, reinforcing steel dowels, and placing or removing earth at the back walk to conform to the existing grade.

Urban Curb, Gutter, and Sidewalk (Type D-3) will be paid by linear foot measured on the top of the curb, regardless of the width of the sidewalk, from expansion joint to expansion joint. Sidewalk width is greater at the bulb outs. Progress payments will be paid based on the urban, curb, and gutter complete

in place.

2.24 Driveway (Type D-1). The contract price for paid for Driveway (Type D-1) includes full compensation for the required and necessary driveway (type D-1) work specified in Technical Specifications Section 105, "Concrete Improvements," including grading, preparing subgrade, thickened slab at the back of the sidewalk, and constructing a smooth transition (conforming) from the back of walk to the existing driveways.

Driveway (Type D-1) will be paid by linear foot. Progress payments will be based on the linear feet of driveway complete in place and measured from expansion joint to expansion joint as shown in the detail. No separate payment will be made for sidewalk or curb and gutter.

2.25 Driveway (Type D-2). The contract price for Driveway (Type 2) includes full compensation for the driveway (type D-2) work specified in Section 1.05, "Concrete Improvements" and shown on the plans, including grading, preparing subgrade, and constructing thickened slab at back of walk.

Driveway (Type D-2) will be paid by linear foot. Progress payments will be based on the linear feet of driveway complete in place and measured from expansion joint to expansion joint as shown in the detail. No separate payment will be made for sidewalk.

2.26 Vertical Curb (Type A1-6). The contract price for Vertical Curb (Type A1-6) includes full compensation for the required and necessary vertical curb (type a1-6) work specified in Section 1.05, "Concrete Improvements" and shown on the plans.

Vertical Curb (Type A1-6) will be paid by linear feet and measured at the top of the curb. Progress payments will be based on the linear feet of vertical curb (type A1-6) complete in place.

2.27 3-Ft Valley Gutter. The contract price for Driveway (Type 2) includes full compensation for the required and necessary 3-ft valley gutter work specified in Section 1.05, "Concrete Improvements" and shown on the plans, including preparing the grading and preparing subgrade.

3-Ft Valley Gutter will be paid on by linear foot measured at the centerline of the valley gutter. Progress payments will be based on the linear feet of valley gutter complete in place.

2.28 6-Ft Valley Gutter. The contract price for Driveway (Type 2) includes full compensation for the required and necessary 6-ft valley gutter work specified in Section 1.05, "Concrete Improvements" and shown on the plans, including grading and preparing subgrade.

6-Ft Valley Gutter will be paid by linear foot basis, measured at the centerline of the valley gutter. Progress payments will be based on the linear feet of valley gutter complete in place.

2.29 Miscellaneous Concrete. The contract price for Driveway (Type 2) includes full compensation for required and necessary miscellaneous concrete work specified in Section 1.05, "Concrete Improvements"

Miscellaneous concrete shall be paid by lump sum. Progress payments will be based on the percentage of miscellaneous concrete complete in place.

Miscellaneous concrete is more specifically described as concrete flatwork adjacent to bioretention area nos. 3, 4, 5, and 6, and valley gutters less than 3 feet in width, and other concrete not addressed by other concrete bid items.

2.30 Full-Depth Reclamation - Cement. The contract price paid for Full Depth Reclamation - Cement" includes full compensation for the required and necessary full-depth reclamation-cement work specified in the Technical Specification and shown on the plans, including asphalt emulsions.

Full-depth reclamation work will be paid by square yard**.** Progress payments will be based on the percentage of full depth reclamation complete in place.

2.31 Cement (Full-Depth Reclamation - Cement). The contract price paid for "Cement (Full Depth Reclamation - Cement)" includes full compensation for the required and necessary for cement (full depth reclamation – cement) work specified in the Technical Specifications and shown on the plans.

Cement (full-depth reclamation - cement) will be paid by ton. Progress payments will be based on the tons applied. Contractor shall furnish weight tags to the Engineer daily and shall indicate on the tags the location (lane and which pass) the material was used.

Quantities of cement wasted or disposed of in a manner not specified, or remaining on hand after completion of the work, will not be paid for. Contractor shall maintain records that show the cement utilized and the costs associated with the increase or decrease. If you use a partial load of cement, weigh the truck and the remaining cement on a scale and submit a weighmaster certificate.

2.32 Hot Mix Asphalt (Type A) The contract price paid for "Hot Mix Asphalt (Type A)" includes full compensation for the required and necessary hot mix asphalt (type A) work specified in the Technical Specifications and shown on the plans, including cleaning the existing surface as needed, application of asphaltic prime coat and/or binder, and testing.

Hot Mix Asphalt (Type A) will be paid by ton. Contractor shall furnish weight tags to the Engineer daily and shall indicate on the tags the location (lane and which pass) the material was used.

Hot Mix Asphalt (Type A) is more specifically defined as the hot mix asphalt placed over the Full Depth Reclamation and the parking areas. The parking areas are (1) the parking lot at 2119 Addison Avenue, the area east of the 3 ft valley gutter between E. Bayshore Road and Garden Street, and from the edge of FDR to the east edge of the asphalt paving from the 3 feet valley gutter to the 6 feet valley gutter at Garden Street.

Hot mix asphalt at digouts will be paid separately as part of Base Failure Repair (Digout).

2.33 Base for AC Pavement – Parking. The contract price paid for "Base for AC Pavement – Parking" includes full compensation for the required and necessary work required to construct the base material for the asphalt pavement in the parking areas specified in the Technical Specifications and shown on the plans, including grading, preparing subbase.

Base for ac pavement – parking will be paid by square foot. Progress payments will be based on the percentage of work completed.

The areas of base for ac pavement – parking is more specifically defined as the parking areas at the following locations (1) the parking lot at 2119 Addison Avenue, (2) the area east of the 3 ft valley gutter between E. Bayshore Road and Garden Street, and (3) from the edge of FDR to the east edge of the asphalt paving from the 3 feet valley gutter to the 6 feet valley gutter at Garden Street.

2.34 Base Failure Repair (Digout). The contract price paid for "Base Failure Repair (Digout) shall include full compensation for the required and necessary Base Failure Repair (Digout) specified in the Technical Specifications and shown on the plans, including saw cutting, pavement removal, compacting base material, paving digout area, and testing.

At roadway sections where current asphalt depth is less than 5-inches, Contractor shall remove existing materials to a depth of 5 inches below top of pavement prior to recompacting base material. Where current asphalt section is greater than 5 inches, Contractor may add and compact base material so depth of asphalt is not less than 5-inches.

2.35 Remove AC Speed Hump. The contract price paid for "Remove AC Speed Hump" includes full compensation for required and necessary AC speed hump removal work specified in the Technical Specifications and shown on the plans, including removing to 2" below the existing pavement and reconstructing the pavement.

Remove AC speed hump will be paid by each. Progress payments will be paid based on the number of AC speed humps completely removed.

2.36 Remove AC Pavement. The contract price paid for "Remove AC Pavement" includes full compensation for required and necessary AC pavement removal work specified in the Technical Specifications and shown on the plans, including removing ac pavement or other material to subgrade of the proposed work.

Remove AC payment will be paid by lump sum. Progress payments will be paid based on percentage of ac payment removed.

2.37 AC Speed Hump. The contract price for "AC Speed Hump" includes full compensation for the required and necessary AC speed hump work specified in the Technical Specifications and shown on the plans.

AC Speed Hump will be paid by each. Progress payments will be paid based on the number of ac speed humps complete in place.

2.38 Crack Sealing. The contract price for crack sealing includes full compensation for the required and necessary crack sealing work specified in Technical Specifications Section 109 "Crack Sealing" and shown on the plans.

Crack sealing shall be paid by lump sum. Progress payments will be paid based on the percentage of crack sealing completed.

2.39 Slurry Seal. The contract price paid for "Slurry Seal" shall include full compensation for the required and necessary slurry seal work specified in Technical Specifications Section 108 "Slurry Seal." and shown on the plans, including testing for and furnishing the mix design; surface preparation; sweeping; protecting utility covers; slurry seal; protecting the seal until it has cured; rolling; sweeping; and all other work as shown on the Plans.

Slurry seal will be paid by square yard. Progress payment will be paid based on the square yards of slurry seal complete in place.

2.40 Bioretention Areas. The contract price for "Bioretention Areas" shall include full compensation for the required and necessary bioretention areas work as specified in the Technical Specifications, including removing concrete and asphalt pavement, excavating, scarifying in-situ soil, constructing subdrains, cleanouts, and energy dissipators.

Bioretention areas will be paid by lump sum. Progress payments will be paid based on the percentage of bioretention areas work completed.

2.41 Planting. The contract price for "Planting" includes full compensation for the required and necessary irrigation work specified in Technical Specifications and shown on the plans.

Planting will be paid by lump sum. Progress payments will be paid based on the percentage of planting work completed.

2.42 Irrigation. The contract price for "Irrigation" includes full compensation for the required and necessary irrigation work specified in Technical Specifications and shown on the plans, including the water and electric connection work.

Irrigation will be paid by lump sum. Progress payments will be paid based on the percentage of irrigation work completed.

2.43 Landscaping Maintenance. The contract price for "Landscape Maintenance" includes full compensation for the required and necessary landscape maintenance work specified in Technical Specifications and shown on the plans.

Landscape maintenance will be paid by lump sum. Progress payments will be paid based on the percentage of landscape maintenance work completed.

2.44 Storm Drain Manhole. The contract price for "Storm Drain Manhole" includes full compensation for the required and necessary storm drain manhole work specified in the Technical Specifications and shown on the plans, including excavating, backfilling, reconstructing the pavement section, and pressure testing.

Storm drain manhole will be paid by each. Progress payments will be based on the percentage of storm drain manhole work in place.

2.45 12-Inch RCP. The contract price for "12-inch RCP" includes full compensation for all the required and necessary 12-Inch RCP work specified in the Technical Specifications and shown on the plans, including saw cutting, removing pavement section, trenching, backfilling, reconstructing the pavement section, video inspection, and pressure testing.

12-inch RCP will be paid by linear foot. Progress payments will be based on the percentage of 12-inch RCP completed.

2.46 Inlet Type GO. The contract price for "Inlet Type GO" includes full compensation for the required and necessary Inlet Type GO work specified in the Technical Specifications and shown on the plans, including excavating, backfilling, and reconstructing pavement section, reconstructing curb and gutter.

Inlet Type GO will be paid by each. Progress payments will be based on the percentage of Inlet Type GO work completed.

2.47 Overflow Inlet at Bioretention Area. The contract price for "Overflow Inlet at Bioretention Area" includes full compensation for the required and necessary overflow inlet work specified in the Technical Specifications and shown on the plans, including excavating and backfilling.

Overflow inlet at bioretention area will be paid by each. Progress payments will be based on the percentage of overflow inlets completed.

2.48 Modify Existing Curb Inlet at Bioretention Area #8. The contract price for "Modify Existing Curb Inlet at Bioretention Area #8" includes full compensation for the required and necessary work to modify the existing curb inlet specified in the Technical Specifications and shown on the plans, including removing concrete.

Modify existing curb inlet at bioretention area #8 will be paid by each. Progress payments will be based on the number of curb inlets modified, complete in place.

2.49 Adjust Sanitary Sewer Manhole Frame and Cover to Grade. The contract price for "Adjust Sanitary Sewer Manhole Frame and Cover" includes full compensation for the required and necessary education sign work specified in the Technical Specifications and shown on the plans.

Adjust sanitary sewer manhole frame and cover to grade will be paid by each. Progress payments will be based on the number of sanitary sewer frames and covers adjusted, complete in place.

2.50 Reconstruct Sanitary Sewer Utility Lateral. The contract price for includes full compensation for the required and necessary reconstruct sanitary lateral work specified in the Technical Specifications and shown on the plans.

Reconstruct Sanitary Sewer Utility Lateral will be paid by each. Progress payments will be based on the number of sanitary sewer utility lateral reconstructed, complete in place.

Reconstruct sanitary sewer utility lateral includes replacing the lateral from the sanitary sewer main to the property so it is over or under the proposed storm drain to eliminate the conflict, including replacing

the tee at the sanitary sewer main, if required, replacing the existing sewer lateral with a new pipe, and reconnecting the new pipe to the existing lateral pipe before the property line.

2.51 Water Service Lateral. The contract price for "Water Service Lateral" includes full compensation for the required and necessary water service lateral work specified in the Palo Alto Parks Mutual Water Company's Technical Specifications and shown on the plans and as directed by the Engineer, including saw cutting, trenching, backfilling, and reconstructing the pavement section.

Water service lateral includes replacing water service lateral at proposed storm drainpipe conflicts and conflicts with the bioretention area. Water service lateral includes constructing a new saddle and corporation stop, if required, which will be required for some water services that conflict with bioretention areas.

Regardless of the extent of work on a water service lateral, water service lateral will be paid by each. Progress payments will be based on the number of water service laterals, complete in place.

2.52 Abandon Water Service Lateral. The contract price for "Abandon Water Service Lateral" includes full compensation for the required and necessary abandon a water service lateral work at the corporation stop at the water main specified in the Technical Specifications and shown on the plans or as directed by the Engineer, including trenching, backfilling, and reconstructing the pavement.

Abandon water service lateral will be paid by each. Progress payments will be based on the number of water service laterals, complete in place.

2.53 Adjust Water Valve Box with Cover to Grade. The contract price for "Adjust Water Valve Box with Cover to Grade" includes full compensation for the required and necessary work to adjust the water valve box with cover to grade specified in the Technical Specifications and shown on the plans, including asphalt removal around box, placing concrete collar, and placing asphalt.

Adjust water valve box with cover to grade will be paid by each. Progress payments will be based on the number of adjusted water valve box adjusted, complete in place.

2.54 Adjust Water Meter Box with Cover to Grade. The contract price for "Adjust Water Meter Box with Cover to Grade" includes full compensation for the required and necessary work to adjust water meter box with cover to grade specified in the Technical Specifications and shown on the plans.

Adjust water meter box with cover to grade will be paid by each. Progress payments will be based on the number of water meter boxes with covers adjusted, complete in place. Payment will be made after concrete or asphalt is placed around the box is in place.

2.55 Adjust Telephone Box with Cover to Grade. The contract price for "Adjust Telephone Box with Cover to Grade" includes full compensation for the required and necessary work to adjust the telephone box and cover to grade specified in the Technical Specifications and shown on the plans.

Adjust telephone box with cover to grade will be paid by each. Progress payments will be based on the number of telephone box with cover adjusted, complete in place. Payment will be made after concrete around the box is in place.

2.56 Project Funding Sign. The contract price paid for "Project Funding Sign" includes full compensation for the required and necessary project funding sign work, including changes to the information displayed on the project funding sign.

Project funding sign will be paid by each. Progress payments will be paid based on the number of project funding signs complete in place.

The project funding sign shown in the plans is an example of the graphics that might be displayed on the project funding sign. Engineer will provide other graphics to be displayed on the project funding and no additional compensation will be allowed for incorporating new graphics into the work.

2.57 Remove Roadside Sign. The contract price for "Remove Roadside Sign" includes full compensation for the required and necessary removal work specified in the Technical Specifications and shown on the plans, including salvaging signs, disposing of signs not incorporated into the work, removing post and post foundation, backfilling foundation hole, reconstructing concrete or asphalt.

Remove sign will be paid by each. Progress payments will be based on the number of signs removed, complete in place, including restoration of pavement or concrete.

2.58 Salvage Pedestrian Barricade w/ Sign. The contract price paid for "Salvage Pedestrian Barricade w/ Sign" includes full compensation for the required and necessary salvage pedestrian barricade work, including cleaning and storing the barricade and installing temporary barricades to block pedestrians from crossing at the locations of the permanent pedestrian crossing barricades.

Salvage Pedestrian Barricade w/ Sign will be paid by each. Progress payments will be paid as follows: 50% when the barricade is removed and 50% when the temporary barricades are removed and after the re-installation of the salvaged barricades.

2.59 Remove Striping, Pavement Markers, and Pavement Markings. The contract price for "Removing Striping, Pavement Markers, and Pavement Markings" includes full compensation for the required and necessary removal work specified in Technical Specifications and shown on the plans.

Remove striping, pavement markers, and pavement markings will be paid by lump sum. Progress payments will be paid based on the percentage of removal work completed.

2.60 Thermoplastic Pavement Markings. The contract price for "Crosswalk and Limit Line Stripe" includes full compensation for the work specified in the Technical Specifications and shown on the plans and Caltrans Standard Details.

Thermoplastic pavement markings will be paid by square foot. Progress payments will be based on the square feet of markings, complete in place.

2.61 Crosswalk and Limit Line Stripe. The contract price for "Crosswalk and Limit Line Stripe" includes full compensation for the work specified in the Technical Specifications and shown on the plans and Caltrans Standard Details.

Crosswalk and Limit Line Stripe will be paid by square foot. Progress payments will be based on the square feet of striping, complete in place.

2.62 Detail 22 Striping. The contract price for "Detail 22 Striping" includes full compensation for the Detail 23 striping work specified in the Technical Specifications, shown on the plans and Caltrans Standard Details.

Detail 22 Striping will be paid by linear foot. Progress payments will be based on the linear feet of Detail 23 Striping, complete in place.

2.63 Detail 23 Striping. The contract price for "Detail 23 Striping" includes full compensation for the Detail 23 striping work specified in the Technical Specifications, shown on the plans and Caltrans Standard Details.

Detail 23 Striping will be paid by linear foot. Progress payments will be based on the linear feet of Detail 23 Striping, complete in place.

2.64 Educational Sign. The contract price for "Educational Sign" includes full compensation for the required and necessary education sign work specified in the Technical Specifications and shown on the plans.

Educational sign will be paid by each. Progress payments will be based on the number of educational

signs, complete in place.

2.65 Pedestrian Barricade w/ Sign. The contract price for "Pedestrian Barricade w/ Sign" includes full compensation for the required and necessary work to re-install the salvaged pedestrian barricade with sign specified in the Technical Specifications and shown on the plans, including cleaning the barricade and sign, drilling concrete for anchor bolts, and installing new concrete anchors.

Pedestrian barricade w/ sign will be paid by each. Progress payments will be based on the number of pedestrian barricades with sign, complete in place.

2.66 Roadside Sign (Salvaged Sign). The contract price paid for "Road Sign (Salvaged Sign) includes full compensation for the required and necessary roadside sign (salvaged sign) work specified in the Technical Specifications Section 111, "Striping and Signage," including saw cutting, installing the new signpost, sign post foundation and a salvaged or replacement sign, as well as removing and replacing concrete sidewalk flags or asphalt.

Road Sign (Salvaged Sign) will be paid by **each.** Progress payments for Roadside Sign (Salvaged Sign) will be paid based on the number of signs installed complete in place, including replacement of concrete or asphalt.

2.67 Replacement Sign. The contract price paid for "Replacement Sign" includes full compensation for furnishing a replacement sign, required by the Engineer, specified in the Technical Specifications Section 111, "Striping and Signage," including disposal of existing signs not incorporated into the work.

Replacement sign will be paid by each. Progress payments for replacement sign will be paid based on the number of signs furnished.

Installation of the replacement sign will be paid as part of the "Roadside Sign (Salvaged Sign)."

2.68 Two-way Reflective Blue Pavement Marker. The contract price for "Two-way Reflective Blue Pavement Marker," includes full compensation for required and necessary two-way reflective blue pavement marker work specified in Technical Specifications Section 111, "Striping and Signage", and shown on the plans.

Two-way reflective blue pavement marker will be paid by each. Progress payments will be based on the number of pavement markers, complete in place.

END OF SECTION 100

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SECTION 101

GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 GENERAL

All work shall conform to the applicable provisions of the San Mateo County Standard Specifications and Details, the latest State of California, California Manual on Uniform Traffic Control Devices (MUTCD), Department of Transportation, Standard Plans and Standard Specifications, and the project plans and specifications.

No work shall be performed on Saturdays and Sundays for the duration of this project unless a variance is approved by the City.

Implementation of Construction Best Management Practices (BMPs) will be required for this project.

1.2 WORK ON PALO ALTO PARK MUTUAL WATER COMPANY'S WATER FACILITIES

Work on the Palo Alto Park Mutual Water Company water facilities shall conform to the requirements in the Palo Alto Park Water Company, Standard Specifications & Details for Water Main Installation.

1.3 ROADWAY PREPARATION

The work under this section consists of preparing the roadway prior to resurfacing or reconstruction as specified in the Special Provisions, these Technical Provisions, and as required by the Engineer. Such work shall include controlling nuisance water; sweeping; watering; removal of all raised pavement markers; removal of all thermoplastic pavement markings; removal of loose and broken concrete, asphalt concrete pavement, and foreign material; and the spraying and removal of weed growth. In addition, the Contractor shall implement a Storm Water Pollution Prevention Program prior to the start of construction, as specified in the Special Provisions. The Storm Water Pollution Prevention Program shall also comply with Section 13 Water Pollution Control of the State Standard Specifications.

1.4 PROJECT SITE MAINTENANCE

Throughout all phases of construction until final acceptance, including any periods of work suspension, the site shall be kept clean and free from rubbish and debris. The Contractor shall furnish and operate a self-loading motor sweeper at least once at the end of each shift for the entire project limits for the purpose of keeping paved areas acceptably.

Dust control shall consist of applying either water or dust palliative, or both, for the alleviation or prevention of dust nuisance. Dust resulting from the Contractor's performance of the work, either inside or outside the right of way, shall be controlled by the Contractor in conformance with the provisions in Section 7, "Legal Relations and Responsibility to the Public" of the State Standard Specifications. Water shall be applied as provided in Section 17 "Clearing and Grubbing" and dust palliative shall conform to and be applied as provided in Section 18 "Dust Palliative" of the State Standard Specifications.

Excess excavated materials from any source shall be removed from the site immediately. Forms and lumber shall be removed the day of form removal. Materials and equipment shall be removed from the site as soon as they are no longer necessary.

Before the final inspection, the site shall be cleared of equipment, unused materials, and rubbish so as to present a satisfactory clean and neat appearance. All pavement areas shall be swept with a street sweeper immediately prior to the final inspection. All concrete areas shall be broom cleaned. All topsoil areas shall be raked. All cleanup costs shall be included in the Contractor's bid. In the event that the Contractor fails to perform this final cleanup, the Agency may remove and/or dispose of the articles or materials at the Contractor's expense. Care shall be taken to prevent spillage on haul routes. Any such spillage shall be removed immediately and the area cleaned.

The Contractor is advised that the disposal of solid waste sewage, industrial waste or other polluted waters into public storm drain system is prohibited under East of Palo Alto Municipal Code and under California State Fish & Game Code Section 5650. Any fines or penalties levied against the Contractor for violation of the above and related regulation are the sole responsibility of the Contractor.

1.5 SANITARY FACILITIES

The Contractor shall provide and maintain enclosed, portable restrooms for the use of personnel engaged in the work. These accommodations shall be maintained in a neat and sanitary condition, and shall comply with all applicable laws, ordinances, and regulations pertaining to public health and sanitation. All toilets shall be removed from the right of way at the end of each shift unless the located in the staging area described below.

1.6 STAGING & STORING

The Contractor shall store all equipment and materials in a manner which does not interfere with public right of way. When not actively working in the right-of-way, Contractor shall not park equipment or vehicles or store materials in the public right of way, unless authorized by the Engineer in writing.

Contractor may utilize the area outside of the paved street on the east side of Addison Avenue between the fire hydrant at 14+65 +/- (right) and telephone pole at 115+85 +/- (right) for staging of equipment, vehicles, and one or more Conex-type boxes. Contractor shall install a six-foot high temporary chain link fence with green mesh screening material so the area inside the fence is not visible to the public. No fencing shall be installed within 10 feet of the fire hydrant. Contractor is required to post no-parking signs in advance of utilizing the area, as described elsewhere in the specifications.

Contractor may make arrangements with local property owners for temporary staging areas; however, the location shall first be brought to the attention of the Engineer for approval. Contractor will also be required to provide proof in writing from the property owner that the Property is allowed for use as a temporary staging area.

Contractor shall take adequate measures to secure all equipment and materials at the staging area after the completion of work each day. The City will not be responsible for any damage or loss incurred on Contractor's equipment or materials.

1.7 PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS

The Contractor shall be responsible for the protection of public and private property adjacent to the work and shall exercise due caution to avoid damage to such property.

The Contractor shall repair or replace all existing improvements within the right-of-way or on adjacent private property which are not designated for removal, but that are damaged or removed as a result of its operations. Repairs and replacements shall be at least better than the existing improvements and shall match them in finish and dimension to the satisfaction of the Engineer.

1.8 PRE-CONSTRUCTION DOCUMENTATION

Contractor shall submit a video on DVD of the construction area prior to beginning work. This video shall be the existing condition record of the job site. The taping shall be done by the Contractor and a copy of the DVD shall be furnished to the Project Inspector at the beginning of the Work. The Project Inspector may participate during the videotaping task. Contractor shall provide a written log noting defects or irregularities in the existing pavement area.

1.9 PUBLIC NOTIFICATION AND OUTREACH

Two weeks prior to beginning any work on the project, the Contractor shall deliver written notice to all adjoining residents, businesses, tenants and other applicable parties. Notice shall be given for general construction activity in an area as well as specific activities that will, in anyway, inconvenience residents/property owners/tenants or affect their operations or access to their property. Such notices shall include the expected date for start of construction, a general description of the construction activity to take place, expected duration, and the name, address, and contact number of the Contractor's superintendent and of the City's Project Engineer.

A follow up notice shall be distributed two days prior to the construction activity. Copies of all notices shall be provided to the Engineer for approval five working days prior to the desired distribution date.

The Contractor shall contact and coordinate the work with the following, but not limited to, parties. Two-week notification shall also be given to adjacent properties prior to beginning any work.

1.10 COORDINATION WITH OTHER PROJECTS

Contractor shall coordinate its operations with the other projects to avoid conflicts between projects.

The East Palo Alto Sanitary District, PG&E gas, and AT&T have and will have projects within the project limits.

1.11 TESTING AND SAMPLING

A. Work shall include the Sampling & Testing of construction methods and installed materials, to determine compliance with contract requirements of installed conditions of base repairs - digouts, and hot mix asphalt paving. Sampling and testing shall be performed when required by the specifications.

B. Sampling & testing shall also be in conformance with Section 39 of the State Standard Specifications.

C. Testing shall be undertaken by **an independent, third party, testing laboratory/contractor** qualified to perform sampling and testing required by this contract. Selection of testing laboratory/contractor shall be approved by the Engineer. Sampling and Testing shall be paid for by the Contractor.

D. Prepare a written record that documents the location, date and time of the sampling and testing for each of the following technical specifications sections and their associated work:

- Base Repair - Digouts
- Hot Mix Asphalt (Type A) Paving

E. Testing results shall be provided showing actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. Test results shall cite applicable specification references and required tests or analytical procedures used. Test results shall be certified by a testing laboratory representative authorized to do so. Report shall have the cover sheet conspicuously stamped in large red letters "CONFORMS" or "DOES NOT CONFORM". If the item(s) fails to conform, the laboratory shall notify the Engineer.

Sampling and testing results shall be submitted daily, within 24 hours of test taking. Tests that require more than 24 hours for processing shall be submitted within 24 hours of completion of test.

Submittal of results 24 hours beyond the completion of lab work shall be subject to $250 penalty per late submittal.

Complete all required testing identified in Section 39 of the State Standard Specifications for the work related with "Base Failure Repair (Digouts)" and "Hot Mix Asphalt (Type A)" Technical Specification sections.

1.12 TREE AND ROOT PROTECTION

Due care shall be taken when working near trees, public or private. For all phases of the work, Contractor is responsible for protecting trees and Contractor will replace any trees judged damaged by the City, unless otherwise noted on the Plans.

Trees situated in a tree well or sidewalk planting strip shall be wrapped with 4 layers of orange plastic fencing as padding from the ground to the first branch with 1-inch thick wooden slats bound securely on the outside. During installation of the wood slats, caution shall be used to avoid damaging any bark or branches. Major scaffold limbs may also require protection as directed by the Engineer to a height of 12 feet above the ground. Contractor shall make every effort to keep deleterious materials associated with project construction from contacting any part of the trees.

For all phases of work, Contractor shall not cut any roots greater than 2-inches in diameter. When roots greater than 2-inches in diameter are encountered, Contractor shall notify the Engineer and allow 3 business days to cut the roots. No compensation shall be given to the Contractor for any time for the City root cutting. Contractor shall not scrape, skin, or pull on roots. Any root cutting shall be done with clean and sharp blades/tools.

Should tree, root, and/or bush pruning be required to construct the improvements shown on the plans, specified in these Specifications, and as directed by the Engineer, Contractor shall notify the Engineer and allow 3 business days before pruning. All pruning shall be done as directed by the City Arborist and in the presence of the City Arborist.

Contractor shall make every effort to avoid damaging any City owned property, including (roots, trunk and canopy of) City maintained trees. If damages to trees are found to be as part of Contractor negligence, Contractor shall be responsible for as follows:

a. Contractor will provide full reparation to include: removal of irreparable tree and replacement with similar approved species. Contractor will perform this work themselves (at Contractor's expense) under supervision of City forestry personnel, and/or,
b. Contractor will reimburse City for City expenses incurred in the related reparation work, consisting of but not limited to, site inspections, corrective pruning, tree removal, and tree replacement.
c. Damages shall be graded 1 (minor) through 5 (replacement), as determined by City, with monetary values attached.

1.13 SITE CLEANUP

Payment for work required under the General Requirements shall be included in the prices bid for the individual items of work and no additional compensation will be allowed therefore unless specifically noted otherwise.

In the event that the Contractor fails to perform this final cleanup, the Agency may remove and/or dispose of the articles or materials at the Contractor's expense.

Care shall be taken to prevent spillage on haul routes. Any such spillage shall be removed immediately, and the area cleaned.

The Contractor is advised that the disposal of solid waste sewage, industrial waste or other polluted waters into public storm drain system is prohibited under East of Palo Alto Municipal Code and under California State Fish & Game Code Section 5650. Any fines or penalties levied against the Contractor for violation of the above and related regulation are the sole responsibility of the Contractor.

1.14 PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS

The Contractor shall be responsible for the protection of public and private property adjacent to the work and shall exercise due caution to avoid damage to such property.

Since proposed improvements have conflicts with existing underground utility facilities owned by PG&E, Palo Alto Park Mutual Water Company, AT&T and other owners, the Contractor shall coordinate and communicate with these utility owners prior to and during construction regarding these conflicts.

The Contractor shall repair or replace all existing improvements within the right-of-way or on adjacent private property which are not designated for removal or adjustment, but that are damaged or removed as a result of its operations. Repairs and replacements shall be at least equal to existing improvements and shall match them in finish and dimension.

1.15 CALL UNDERGROUND SERVICE ALERT PRIOR TO EXCAVATING, POTHOLING OR OTHER EARTH DISTURBING ACTIVITIES

Contractor, except in an emergency, shall contact the appropriate regional notification center, Northern California Underground Service Alert at 811 or 1-800-227-2600 or on-line at www.digalert.org at least five working days prior to commencing any excavation and obtain an inquiry identification number from that notification center. No excavation shall be commenced or carried out by the Contractor unless such an inquiry identification number has been assigned to the Contractor or any subcontractor of the Contractor and the City has been given the identification number by the Contractor.

1.16 EXISTING MONUMENTS AND BENCHMARKS

All monumental benchmarks, land corners, and triangulation points, established by other surveys, existing within the construction area shall be preserved. If existing monuments interfere with the work, secure written permission before removing them.

1.17 ORDER OF WORK

Work Sequence and Specific Considerations shall include but shall not be limited to the following provisions (i.e., although these requirements are not restated under each individual bid item, they shall be deemed included under each bid item as applicable at no additional cost). The following is a list of general sequences and special considerations for the project:

Contractor shall perform the work described in Utility Potholing – Design, as the first item of work. Contractor shall prioritize "Utility Potholing – Design" work related to potential conflicts between the proposed storm drain system and bioretention areas with existing sanitary sewer pipes and laterals, existing water mains and laterals.

Contractor shall not mobilize for any other work unless described below or authorized by the Engineer in writing, until 30 working days after all Utility Potholing-Design information described above and the Technical Specifications is provided to the Engineer.

Contractor may establish the staging area; reconstruct fences and/or gates; remove trees concurrently with Utility Potholing – Design work.

1.18 REFERENCES

All references to 'City' in any of the contract documents or referenced standards or publications shall mean the City of East Palo Alto.

All references to 'Engineer' in any of the contract documents or referenced standards or publications shall be the designated representative of the City of East Palo Alto.

1.19 MEASUREMENT AND PAYMENT

Payment for work required under the General Requirements shall be included in the prices bid for the individual items of work and no additional compensation will be allowed therefore unless specifically noted otherwise.

1.20 PROGRESS SCHEDULE (CRITICAL PATH METHOD)

Contractor shall perform the worked required by Caltrans Standard Specifications 8-1.02A, "Schedule."

1.21 CONSTRUCTION STAKING AND SURVEYS

Contractor shall furnish all surveying and construction staking required to complete the construction as shown on the plans. Contractor shall indicate the surveying activities within the required project schedules.

All construction staking shall be done under the responsible charge of a Civil Engineer authorized to practice land surveying or a Land Surveyor registered in the State of California, hired by the Contractor.

Stakes shall be installed at 25' intervals or less, unless otherwise permitted by the Engineer.

All stakes shall be clearly marked and copies of cut sheets shall be provided to the City at least two working days in advance of their planned use. This shall in no way relieve the Contractor of the responsibility for assuring final grades, alignments and locations of improvements that conform to the plans.

All official survey monuments or benchmarks shall be carefully preserved. If a monument or benchmark is anticipated to be disturbed, the Contractor shall reference its location and elevation to at least four short ties (set iron pipes) and two copies of the field notes showing the ties shall be presented to the Engineer for review and approval prior to disruption. A Surveyor registered in the State of California shall remark the monuments after construction is complete and file appropriate paperwork with the County Recorder's office.

In cases of accidental damage or displacement of the monuments where, in the opinion of the Engineer, new concrete monuments are required, two copies of the field notes showing new locations, ties and elevations shall be furnished to the Engineer. New monuments shall be of a type and quality in accordance with the San Mateo County Standard Drawings and shall be placed in a manner consistent with good and recognized engineering and surveying practices in accordance with State of California and County of San Mateo regulations. Replacement of monuments disturbed by the Contractor shall be paid for at the Contractor's sole expense.

Control points and additional horizontal control data (CAD files) will be provided to the Contractor after award of contract.

Construction staking and surveys for line and grade shall be the responsibility of the Contractor.

All work shall conform to Section 5-1.26 "Construction Surveys" of the State Standard Specification.

1.22 UTILITY POTHOLING - DESIGN

"Utility Potholing – Design" is potholing intended to identify conflicts between existing utilities and the proposed storm drain system and bioretention areas. Water and sanitary sewer facilities may require reconstruction, which is not shown on the plans, in advance of work shown on the plans. See "Order of Work" in this section. In addition, additional potholing will be paid under this item to locate and determine the depth of the water facilities FDR construction activities areas.

Utility conflicts may require the reconstruction of portions of the existing water main at storm drain storm crossings and at Bioretention areas No. 8, as well as the sanitary sewer system at storm drain system crossings. Portions of the existing sanitary sewer systems may require reconstruction due to conflicts between the existing sanitary sewer laterals and the new storm drain system.

Contractor shall submit a work plan that identifies the locations of potholes to be performed and paid as part of "Utility Potholing – Design."

Contractor shall use vacuum extraction method or other approved method to pothole. Contractor shall backfill and restore pavement.

To determine potential impacts to the existing water system, Contractor shall pothole (1) proposed storm drain crossings of the existing water main (Stations 17+60 +/- and 29+85 +/-) (tot. 2); (2) proposed alignment of the Concrete Cut-Off Curbs (Type 1) of Bioretention Area No. 8 relative to the existing water main alignment (tot. 2), (3) proposed storm drain crossing of the existing water services (tot. 3 – 2169 and 2175 Addison Avenue); (4) existing water services within the limits of the bioretention areas at water main (tot. 10); (5) existing sanitary main and lateral at proposed storm drain crossing (tot 8).

The Palo Alto Park Mutual Water Company has not installed water meters on the water services. Water meter boxes may be placed over or near existing the existing water service.

Contractor shall provide invert elevations of existing sanitary sewer manholes at no additional charge.

Contractor shall provide a working drawing that show the proposed relocation of water services that are within the limits of a bioretention area.

Contractor shall provide sufficient data to identify any conflicts and for the City to determine if any water mains, sanitary sewer mains, and/or sanitary sewer laterals require relocation.

Contractor shall perform potholing of the existing water main and water services within the limits of the FDR construction. City will pay for up to 5 potholes at the existing water main at up to 10 potholes at the existing water services under "Utility Potholing – Design." The number of potholes described in this section may not be sufficient to determine the impact of the existing utilities on the FDR construction. Any additional potholing shall be paid under "General Utility Potholing." Contractor shall provide top of pipe elevation, existing top of pavement elevation, and proposed top of pavement elevation at each pothole.

At all times during construction, all operating Underground Facilities shall remain in operation, unless the Contract Documents expressly indicate otherwise. Contractor shall maintain such Underground Facilities in service where appropriate; shall repair any damage to them caused by the Work; and shall incorporate them into the Work, including reasonable adjustments to the design location (including minor relocations) of the existing or new installations. Contractor shall take immediate action to restore any in service installations damaged by Contractor's operations.

1.23 GENERAL UTILITY POTHOLING

Prior to any demolition work, Contractor shall pothole all utility mains, services, and laterals within the project site to identify underground utility conflicts. At all times during construction, all operating underground facilities shall remain in operation, unless the Contract Documents expressly indicate otherwise. Contractor shall maintain such Underground Facilities in service where appropriate; shall repair any damage to them caused by the Work; and shall incorporate them into the Work, including reasonable adjustments to the design location (including minor relocations) of the existing or new installations. Contractor shall take immediate action to restore any in service installations damaged by Contractor's operations.

Prior to performing Work at the Site, Contractor shall lay out the locations of Underground Facilities that are to remain in service and other significant known underground installations indicated by the Underground Facilities Data. Contractor shall further locate, by carefully excavating with small equipment, potholing and principally by hand, all such utilities or installations that are to remain and that are subject to damage. If additional utilities whose locations are unknown are discovered, Contractor shall immediately report to Owner for disposition of the same.

If during construction, an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated in the materials supplied by Owner for bidding or in information on file at USA or otherwise reasonably available to Contractor, then Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby (and in no event later than seven Days), and prior to performing any Work in connection therewith (except in an emergency), identify the owner of such Underground Facility and give written notice to that owner and to Owner. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

The cost of all of the following will be included in the Contract Sum and Contractor shall have full responsibility for (a) reviewing and checking all available information and data including, but not limited to, information made available for bidding and information on file at USA; (b) locating all Underground Facilities shown or indicated in the Contract Documents, available information, or indicated by visual observation including, but not limited to, and by way of example only, engaging qualified locating services and all necessary backhoeing and potholing; (c) coordination of the Work with the owners of such Underground Facilities during construction; and (d) the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

Consistent with California Government Code §4215, as between Owner and Contractor, Owner will be responsible for the timely removal, relocation, or protection of existing main or trunk line utility facilities located on the Site only if such utilities are not identified in the Contract Documents or information made available for bidding. Owner will compensate for the cost of locating and

repairing damage not due to Contractor's failure to exercise reasonable care, removing and relocating such main or trunk line utility facilities not indicated in the Contract Documents or information made available for bidding with reasonable accuracy, and equipment on the Project necessarily idled during such Work. Contractor shall not be assessed liquidated damages for delay in completion of the Project when such delay was caused by the failure of Owner or the utility to provide for removal or relocation of such utility facilities.

1.24 RECONSTRUCT FENCE OR RECONSTRUCT FENCE AND GATE(S)

The fences shown to be reconstructed on the plans are believed to be within the public right of way and interfere with the work.

Contractor shall survey the back of the proposed sidewalk/driveways, etc. (1) along the entire west side of Addison Avenue between E. Bayshore Road and Garden Street, as well as (2) near the intersection of the Bay Road. Contractor and Engineer shall walk the surveyed line and agree to the fences and gates to be reconstructed.

Contractor shall dismantle the existing fence and/or gates in a manner to preserve the material. Only materials approved by the Engineer, may be incorporated into the reconstructed fence.

1.25 REMOVE AND TRIM TREES

The trees shown to be removed may interfere with the work. Contractor shall survey the back of sidewalk/driveway at the locations where trees are shown to be removed. Engineer shall walk the surveyed line and determine the trees to be removed prior to the removal of any trees.

Contractor shall trim trees and bushes that interfere with the work, including the trees/bushes at 2293 Addison Avenue and 1240 Bay Road, and are less than seven (7) feet above the new sidewalk/driveways between Garden Street and E. Bayshore Road. Contractor shall remove branches generated from trimming.

END OF SECTION 101

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SECTION 102

MOBILIZATION

PART 1 – GENERAL

Mobilization shall consist of preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site, and implementation of environmental commitments described on Local Assistance NEPA Permits & Environmental Commitment Record in Appendix C of these Specifications, and for all other work and operations which must be performed or for costs incurred prior to beginning work and in the course of work on various contract items at the project site.

The Contractor is advised that there may be insufficient area within the construction zone to provide parking, staging for material, and storage of equipment.

PART 2 – MATERIAL AND EQUIPMENT

(None)

PART 3 – EXECUTION

(None)

PART 4 – MEASUREMENT AND PAYMENT

Included in Section 100 of these Technical Specifications.

END OF SECTION 102

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SECTION 103

TRAFFIC CONTROL

PART 1 – GENERAL

Work shall consist of providing for safe movement of vehicular, bicycle and pedestrian traffic, including persons with disabilities in accordance with the Americans with Disabilities Act (ADA), and traffic control, and construction and equipment staging as described on Local Assistance NEPA Permits and Environmental Commitment Record in Appendix C of these Specifications, through and around construction operations. Traffic control requirements set forth herein are the minimum requirements imposed. The Contractor shall be solely responsible for providing all protective measures necessary.

Should the Contractor fail, in the opinion of the Engineer, to provide all the materials, work force and equipment necessary to maintain traffic around the work area as set forth herein, the City, upon the recommendations of the Engineer, may take steps necessary to suspend the work. The City may then upon such suspension, perform such work as may be necessary to maintain traffic and charge all associated costs to the Contractor.

The contractor shall provide two traffic changeable message boards at beginning and end of project limits (2). Placement of boards shall be confirmed with Engineer prior to placement. Location of changeable message boards shall be included in traffic control plan that is to be submitted by contractor as per subsection 1.03 “Submittals” of this section.

Work shall also include submitting a traffic control, construction (equipment and material) staging, and construction phasing plans prepared for each phase of construction for review.

1.02 REFERENCES

The Contractor shall comply with the latest edition of the “Work Area Traffic Control Handbook” published by Building News Inc.; the “California Manual of Uniform Traffic Control Devices (CA MUTCD), Part 6, “Temporary Traffic Control”, hereinafter referred to as the Traffic Control Manual; and the State Standard Plans and Specifications, California Department of Transportation, latest edition, for items related to traffic control within the work area.

1.03 SUBMITTALS

A. TRAFFIC CONTROL PLAN

At least 15 working days prior to start of work, the Contractor shall submit a traffic control plan describing how traffic control will be achieved during the life of the project, prepared by a traffic engineer or registered civil engineer for approval prior to commencing work. The plans shall be in accordance with the Standard Plans and Specifications and the CA MUTCD on scaled drawings showing required signs, traffic control devices and flaggers for each situation anticipated to be encountered, i.e., intersections, mid-block, etc. both during working and non-working hours.

The traffic control plan shall provide a detailed approach for controlling traffic through the construction zone and for any proposed detours. The traffic control plan shall designate truck routes, where all vehicles exceeding 12,000 pounds gross weight hauling materials to or from the job site shall follow the established truck route streets to the closest point of the job site. The traffic control plan shall also be directed to the regulation and protection of pedestrian traffic including pedestrians, bicyclists, joggers, skaters, skateboarders, etc.

Once approved, the Contractor may modify the Traffic Control Plan only with permission from the

Engineer.

CONSTRUCTION (EQUIPMENT AND MATERIAL) STAGING / FACILITIES

Staging of equipment and material shall be proposed and secured by the Contractor and approved by the Engineer. Contractor may not occupy any property outside of the right-of-way as shown on the plans.

At least 15 working days prior to start of work, the Contractor shall submit a construction (equipment) staging plan for approval prior to commencing work.

B. CONSTRUCTION PHASING PLAN

At least 15 working days prior to start of work, the Contractor shall submit a construction phasing plan for approval prior to commencing work. The plans shall be in accordance with the Standard Plans and Specifications and the CA MUTCD on scaled drawings showing required signs, traffic control devices and flaggers for each situation anticipated to be encountered during working and non-working hours.

The construction phasing plan shall provide a detailed approach for controlling traffic through the construction zone for each stage or portion of the work. It shall show traffic control devices and signage necessary for phased construction or modifications to existing lane configurations.

Once approved, the Contractor may modify the Construction Phasing Plan only with permission from the Engineer.

Construction phasing plan shall be limited to not more than one block and one side of the road at a time or not more than 1000 feet and one side of the road at a time in order to minimize pedestrian traffic interruption. Contractor shall also practice same measures for concrete work associated to sidewalk construction.

PART 2 – MATERIAL AND EQUIPMENT

2.01 TRAFFIC CONTROL DEVICES

Traffic control devices shall conform to the CA MUTCD. Temporary warning signs in the construction area shall have a black legend and border on an orange background. The color of other signs shall follow the standard for all highway signs.

Cones and delineators shall consist of cylindrical or cone shaped plastic devices, 18 inches to 48 inches in height. Cones or delineators shall have a flexible base of suitable weight, which will ensure stability.

Barricades shall be Type I, Type II or Type III as set forth in the Standard Plans and Specifications, and the CA MUTCD. Barricades used during hours of darkness shall be equipped with flashers.

Traffic control devices shall include a minimum of two (2) “Expect Delays” portable changeable message signs (CMS), to be placed at locations approved by the Engineerat least 7 days before the state of construction.

PART 3 – EXECUTION

3.01 PLACEMENT, MAINTENANCE AND REMOVAL OF TRAFFIC CONTROL DEVICES

Proper traffic movement through the work area depends upon the driver controlling and directing his/her vehicle properly under unexpected situations. The Contractor shall advise the public of

such conditions through the use of signs, flaggers, pavement markings, barricades, lights, cones and delineators.

Whenever construction operations obstruct the flow of vehicular or pedestrian traffic or present a hazard to vehicles or pedestrians in the vicinity of construction operations, the Contractor shall take appropriate action to warn, detour, protect and separate drivers and pedestrians from the work area and to direct them to alternate routes.

No one standard sequence of signs or control devices will suit all conditions, which may result from construction operations. Even for the same work the conditions may vary from hour to hour, requiring adjustment and revision of the traffic control program in effect. It is the Contractor's responsibility to adjust his /her traffic control based on the location and situation of the street.

No work may begin at any location until traffic control devices have been placed and if required, adjusted, and revised.

The Contractor shall furnish, install, maintain, and remove at his expense all barricades, signs, lights, or other devices in sufficient quantities necessary to adequately warn of any obstructions to the vehicular or pedestrian travel way. Flaggers shall be provided as necessary for the safety of pedestrians and vehicular traffic and to provide access to properties adjacent to the work.

The provisions in this section will not relieve the Contractor from his responsibility to provide such additional devices or take such measures as may be necessary to comply with the provisions of Section 7-1.04, "Public Safety", of the State Standard Specifications. If any component in the traffic control system is displaced or ceases to operate or function as intended, the Contractor shall immediately repair or replace the component and restore it to its original location.

At the end of each workday, the Contractor shall remove all components of the traffic control system, except portable delineators placed along a pavement elevation differential, or as required by the Engineer.

Construction area signs shall be furnished, installed, and maintained by the Contractor. The term "Construction Area Signs" shall also include temporary object markers and portable delineators required for the direction of public traffic through or around the work area during construction. After construction area signs are no longer required, they shall be removed.

3.02 COORDINATION WITH OTHERS

It is the responsibility of the Contractor to install and coordinate the traffic control plan with other contractors and utility companies working on adjacent roadways, businesses, and homes to avoid delays and conflicts to other projects (if any) and this project.

It is the responsibility of the Contractor to coordinate any and all communications with impacted utility companies prior and during construction.

3.03 LIMITATION ON WORKING HOURS

Contractor shall only implement traffic control and restrictions within the area that is estimated to be between 8:00 AM to 5:00 P.M, unless otherwise indicated or authorized by the Engineer. If night work is necessary, Contractor shall submit a request in writing to the Engineer at least two weeks in advance. Written request must highlight closest intersections that need to be on flashing red, start and end time of flashing red and dates. Notify the residents and businesses at least 48 hours prior to any construction during nighttime if approved by the Engineer. No extra pay or premium pay will be allowed for night work.

3.04 ACCESS TO PRIVATE PROPERTY

When construction work occurs within the City's right-of-way, provisions shall be made for the safe passage of vehicular and pedestrian traffic around the work area at all times.

Access to private residences and businesses shall be maintained at all times. ***When private driveways and entrances must be blocked for the work, Contractor shall make every effort to minimize the time it takes to complete such work, and shall notify the occupants/business owners and the City of the required access closures in accordance with Section 7-1.03 of the State Standard Specifications.***

Before obstructing any private driveway entrance on public streets with equipment or other barriers, for any prolonged period, the Contractor shall notify the occupants of the property to allow for the removal of vehicles in accordance with the Section 3.10, "Parking Restrictions".

Contractor shall provide and maintain pedestrian access to and from the property with blocked access. During non-working hours, no driveway, house, or parking lot shall be denied access to a public roadway.

3.05 ROAD CLOSURES AND DETOURS

The contractor is required to keep one lane open in each direction of travel, at all times during construction except at Full-Depth Reclamation segment of roadway. ***The Contractor will be required to show how this requirement will be adhered to and implemented in the Construction Phasing and Traffic Control Plans required under Section 12-4 "Maintaining Traffic" of the State Standard Specifications.***

Street closures will not be permitted.

The Contractor shall establish and maintain detours where applicable and conduct his construction operations in such a manner so as to minimize the hazard, inconvenience and disruption to the public. The Contractor shall direct and detour traffic through, around and adjacent to construction operations, as specified herein or in accordance with approved traffic control plans.

3.06 EMERGENCY VEHICLE ACCESS THROUGH DETOURS

During all detours the Contractor shall provide for the movement of emergency vehicles through the work area. When temporary traffic control is provided by flaggers they shall be instructed to give immediate passage to emergency vehicles that have activated their lights or sirens.

3.07 FLAGGERS

The Contractor shall employ flaggers as required for each specific detour and at all locations on the construction site where barricades and warning signs cannot control the movement of traffic. Where flaggers are required, they shall be logically placed in relation to the equipment or operation so as to give adequate warning and shall be placed in accordance with the Contract Documents, the CA MUTCD, and the approved Traffic Control Plan.

Flaggers shall utilize high-visibility, reflective safety apparel and hand-paddle signs at all times. Provide flaggers with two-way radios for communication when necessary. Red flags shall only be used for traffic control in emergency situations.

The Contractor shall pay fully the cost of furnishing all flaggers, including transporting flaggers, to provide for passage of public traffic.

3.08 NOTICE TO AGENCIES

The Contractor shall be responsible for keeping all affected agencies, businesses and residents informed of restrictions or limitations to either public or private roads caused by his operations, including but not limited to the City Police and Fire Departments, US Postal Service, Transit Services and Garbage Companies.

3.09 TRAFFIC CONTROL DURING NON-WORKING DAYS AND HOURS

The full width on the traveled way shall be open for public use on non-working days and hours, which are to be defined as Saturdays, Sundays, designated City holidays, after 3:00 p.m. on Fridays, the day preceding designated legal holidays, and when construction operations are not actively in progress.

The Contractor shall not be permitted to maintain any lane or road closure during non-working days and hours without first obtaining written approval of the Engineer. As necessary, the Contractor shall restore travel lanes to their original alignment and configuration by means of backfilling and placing temporary pavement or bridging with steel plates.

The fact that rain or other causes may force suspension or delay of the work shall not relieve the Contractor of his responsibility for maintaining traffic around the project and providing access as specified herein. The Contractor shall at all times keep on the job such materials and equipment as may be necessary to keep streets and driveways within the project area open to traffic and in good repair.

The work site shall be cleaned each day, to the satisfaction of the Engineer. Daily traffic control shall continue to remain in place until cleanup activities have been satisfactorily completed and the Contractor's equipment has been removed from the traveled way.

3.10 PARKING RESTRICTIONS

Contractor shall furnish and distribute written notices to area residents and businesses in accordance with Section 7-1.03 "Public Convenience" of the State Standard Specifications.

The Contractor shall furnish and install "No Parking, Tow-Away" signs on the front and back of Type II barricade at least 72-hours prior to starting construction work in that area. Barricades shall be placed at distances along the roadway of no greater than 100-feet.

Should the construction work not occur on the specified day, new "No Parking – Tow Away" signs shall be posted by the Contractor indicating a revised date. The Contractor may schedule work for the following working day, however, the "No Parking, Tow-Away" signs must be dated and re-posted 72-hours in advance for the restriction to be enforceable.

PART 4 – MEASUREMENT AND PAYMENT

Included in Section 100 of these Technical Specifications.

END OF SECTION 103

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SECTION 104

STORMWATER POLLUTION PREVENTION

PART 1 – GENERAL

A. Prohibit illicit discharge (non-rainwater) into the storm drain system.
B. Construct any and all necessary systems to eliminate contaminants from entering the storm water system.
C. Clean up and control of work site materials, spoils and debris.
D. Removal of contaminants produced by the project.
E. The work shall include the provision of all labor, materials, equipment and apparatus not specifically mentioned herein or noted on the plans, but which are incidental and necessary to complete the work specified.

1.02 APPLICABLE PUBLICATIONS

National Pollution Discharge Elimination system (NPDES) Permit No. CAS612008 – latest version

California Storm Water Best Management Practice Handbooks:
1. Municipal
2. Industrial/Commercial
3. Construction Activity

C.3 Stormwater Technical Guidance Ver 5.0, June 2016 or the latest version.

California State Water Resources Control Board, Construction General Permit CAS000002 Order No. 2010-0014 DWQ (for sites greater than one acre).

Section 13 “Water Pollution Control” of the State Standard Specifications.

1.03 QUALITY ASSURANCE

The Contractor shall designate an individual (to be approved by the City) available at all times of sufficient authority to halt work and implement BMPs and source control measures for the Contractor and all sub-contractors, suppliers, and other personnel that may be at the construction site(s), to prevent non-stormwater discharges from the construction site(s). This individual shall be the contact person for all matters of the project regarding non-stormwater discharges.

All work performed under this contract and all contractors and their associates and/or employees are required to comply with all applicable storm water regulations and to implement Best Management Practices (BMP’s) at all times.

All employees and subcontractors shall be trained on the storm water pollution prevention requirements contained in these specifications. Training records shall be submitted to the City along with requests for progress payment.

A supply of spill clean-up materials such as rags or absorbents shall be kept readily accessible on-site.

1.04 ALLOWABLE DISCHARGES

Under current NPDES regulations, the following discharges to the storm drainage system are permitted, as long as the discharges are not significant pollutants:
1. Diverted stream flows, springs and natural drainage courses;

2. Rising flood waters;
3. Air conditioning condensation; and
4. Landscape irrigation.

Groundwater from dewatering and foundation drains will need additional certification that the groundwater has been tested or evaluated for the presence of pollutants subject to non-stormwater discharge regulations. In such a case, a Special Sewer Discharge Permit shall be required for the water to be discharged to the Sanitary Sewer System, as directed.

1.05 SUBMITTALS

The Contractor shall develop and implement a Water Pollution Control Plan (WPCP) which shall contain at a minimum the items included in this section. The WPCP shall show the locations of all storm drains, storm drain pipes, points of entry (catch basins, inlets, outlets), and other features through which stormwater flows. The WPCP shall include a protocol for allowing drainage to flow properly during rainfall events while still preventing non-stormwater discharges from entering the storm drains, creeks, and Bay. Work shall not begin without the Engineer completing its review and finding no exceptions taken on the WPCP and finding at Engineer's sole discretion that the WPCP meets the intent and goals of the project.

The WPCP shall include descriptions and sketches of all BMPs, show locations and describe protocols for implementing and maintaining the following BMPs for but not limited to material storage, dewatering operations, bypass pumping, saw-cutting operations, pavement operations, concrete operations, grading and excavation operations, spill prevention and control, vehicle and equipment cleaning, vehicle and equipment operation and maintenance, litter control, dust control, pavement cleaning, and construction waste management.

The WPCP shall be updated to meet changing stages of the construction site(s).

1.06 PENALTIES

The Contractor is responsible for penalties assessed or levied on the Contractor or the City as a result of his failure to comply with the provisions in this section 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 Contractor or the County, including those levied under the Federal Clean Water Act and the State 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.

PART 2 – PRODUCTS

Materials used shall be in conformance with Caltrans's Construction Site Best Management Practices (BMPs) Manual, latest edition, or the CASQA Construction BMP Handbook, latest edition.

A supply of spill clean-up materials such as drip pans, rags, or absorbents shall be kept readily accessible on-site.

PART 3 – EXECUTION

3.01 RECYCLING

At the end of each working day, all scrap, debris and waste material shall be collected and materials disposed of properly.

Dry, empty paint cans/buckets, old brushes, rollers, rags and drop cloths shall be disposed of in approved waste collection.

Dumpsters shall be inspected for leaks. As leaks are detected, the trash hauling contractor shall be contacted to replace or repair dumpsters that leak.

Water from cleaning dumpsters shall not be discharged on-site.

Regular waste collection shall be arranged for before dumpsters overflow.

3.12 HAZARDOUS MATERIAL/WASTE MANAGEMENT/MATERIALS MANAGEMENT

Designated areas of the project site shall be proposed by the contractor for approval by the Engineer suitable for material delivery, storage and waste collection as far from catch basins, gutters, drainage courses and creeks as possible.

All hazardous materials such as pesticides, paints, thinners, solvents and fuels; and all hazardous wastes such as waste oil and antifreeze shall be labeled and stored in accordance with State and Federal regulations.

All hazardous materials and all hazardous wastes shall be stored in accordance with secondary containment regulations, and it is recommended that these materials and wastes be covered as needed, to avoid potential management of collected rain water as a hazardous waste.

The contractor shall dispose of all excess thinners, solvents, chemicals, oil-based and water-based paint as hazardous waste.

Regular hazardous waste collection shall be arranged for to comply with time limits on the storage of hazardous wastes.

Granular materials shall be stored a minimum of ten feet from the closest catch basin and curb return. The contractor shall not allow these granular materials to enter the storm drain or creek.

Warning signs shall be posted in areas containing or treated with chemicals.

An accurate up-to-date inventory, including Material Safety Data Sheets (MSDS) of hazardous wastes stored on site shall be kept and available to assist emergency response personnel in the event of a hazardous materials incident.

Maintenance and fueling of vehicles and equipment shall be performed in a designated, bermed area, or over a drip pan that will not allow run-off of spills. Vehicles and equipment shall be regularly checked and have leaks repaired promptly. Secondary containment, shall be used to catch leaks or spills any time that vehicle or equipment fluids are dispensed, changed or poured**.**

3.03 CHEMICAL USAGE

When rain is forecast within 24 hours, or during wet weather, the Engineer may prohibit the contractor from applying chemicals in outside areas.

Pesticides or fertilizers shall not be over-applied and material manufacturer’s instructions shall be followed regarding uses, protective equipment, ventilation, flammability and mixing of chemicals. Over-application of a pesticide constitutes a “label violation” subject to an enforcement action by the San Mateo County Agriculture Commissioner.

3.04 DUST CONTROL

Use means necessary to control dust on and near the work, and on and near off-site areas, if such dust is caused by the Contractor's operations during performance of the Work, or if resulting from the condition in which the Contractor leaves the site.

Thoroughly moisten surfaces as required to prevent dust being a nuisance to the public, neighbors, and personnel performing other work on the site.

Use dust palliatives or reclaimed water (not potable water).

Reclaimed water shall be used to control dust on a daily basis or as directed by the Engineer.

At the end of each working day, or as directed by the Engineer, the roadways and on-site paved areas shall be cleaned and swept of all materials attributed to or involved in the work. Streets shall not be washed down into a storm drain or creek in lieu of street sweeping. Water wash may be picked up by a vacuum unit in lieu of sweeping.

3.05 SAWCUTTING

The contractor shall cover or barricade catch basins using control measures such as filter fabric, straw bales, sand bags and fine earthen dams to keep slurry out of the storm drain system. The contractor shall ensure that the entire opening is sealed.

Saw cutting debris and spoils be removed by shovel, absorption, vacuum or pick up of waste prior to moving to the next location or at the end of each working day, whichever is sooner.

3.06 DEWATERING OPERATIONS

Water shall be routed through a control measure as determined and approved by the Engineer such as a sediment trap, sediment basin or Baker tank to remove settleable solids prior to discharge to the storm drain system. Filtration of the water following the control measure may be required on a case-by-case basis.

The filtered water shall be reused for other purposes such as dust control or irrigation to the extent possible.

If the project is within an area of known groundwater contamination, the water from dewatering operations shall be tested prior to discharge. If the water meets the Regional Water Quality Control Board standards, it may be discharged into the storm drain. Otherwise, the water shall be treated and hauled off-site for proper disposal.

3.07 CONCRETE GROUT AND MORTAR WASTE MANAGEMENT

Concrete, grout and mortar shall be stored away from the drainage areas and ensure that these materials do not enter the storm drain system.

Concrete trucks shall not be washed out into streets, gutters, storm drains, drainage channels or creeks.

Concrete trucks and equipment shall be washed out off-site or in a designated area on-site where the water will flow onto dirt or into a temporary pit or bermed area. The water shall percolate into the soil and the hardened concrete placed in a waste container for disposal. If a suitable soil or bermed area is not available on-site, the wash water shall be collected and removed off-site and disposed of properly.

Water created by the washing of exposed aggregate concrete finish shall be collected in a suitable dirt area or filtered through straw bales or equivalent material before entering the storm drain system. Sweepings from exposed aggregate finish shall be collected and disposed of in a waste container or removed off-site and disposed of properly.

3.08 PAVING OPERATIONS

No paving while it is raining.

During wet weather store paving equipment indoors or cover with tarp or other waterproof covering.

Place drip pans or absorbent materials under paving equipment when not in use.

Catch basins and manholes shall be covered when paving or applying seal coat, tack coat, slurry seal or fog seal.

The Engineer may direct the contractor to protect drainage courses by using control measures such as earth dike, straw bale and sandbag to divert run-off or trap filter sediment.

Excess sand (placed as part of a sand seal or to absorb excess oil) shall not be swept or washed down into gutters, storm drains or creeks. The sand shall be collected and returned to the stockpile or disposed of in a trash container or hauled to an approved dump site. Water shall not be used to wash down fresh asphalt concrete.

3.09 PAINTING

The cleaning of painting equipment and tools shall be performed in a designated area that will not enter the gutters, storm drains or creeks.

Excess paint shall be removed from brushes, rollers and equipment prior to cleanup.

Wash water from aqueous cleaning of water-based paint tools and equipment shall be disposed of in a sanitary sewer or onto a designated dirt area.

Paint thinners and solvents from oil-based paints shall be filtered and re-used when possible. Waste sludge, thinner and solvent from cleaning tools and equipment shall be disposed of as a hazardous waste**.**

3.10 SITE CLEANUP

The cleaning of equipment of materials shall not be performed on-site or in the street using soaps, solvents, degreasers, steam cleaning or equivalent methods.

All cleanup must be performed in a designated area that will not allow the cleaning rinse to flow off-site or into streets, gutters, storm drains, or creeks.

PART 4 – MEASUREMENT AND PAYMENT

Included in Section 100 of these Technical Specifications.

END OF SECTION 104

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SECTION 105

CONCRETE IMPROVEMENTS

PART 1 – GENERAL

Existing and new concrete facilities including, but not limited to, curb ramps, curb, gutter, and valley gutter shall be removed and replaced or constructed at the locations indicated on the plans or as directed by the Engineer.

All new curb ramps shall have detectable warning surfaces installed.

1.1 COORDINATION

Contractor shall notify the City 48 hours in advance of concrete removal.

At some locations, concrete repairs are specified to address damage due to tree roots and to comply with ADA guidelines. Contractor shall obtain approval from a licensed arborist prior to cutting, pruning or removing any tree roots while performing concrete repairs. Contractor shall apply root barriers prior to placing new concrete.

1.2 SUBMITTALS

The Contractor shall furnish a concrete mix design to the Engineer at least ten (10) working days prior to the start of the work.

PART 2 – MATERIAL AND EQUIPMENT

Concrete shall conform to the provisions of Section 90 of the Standard Specifications.

2.1 CONCRETE MIX DESIGN

The Contractor shall furnish a concrete mix design to the Engineer at least ten (10) working days prior to the start of the work, based on the following guidelines:

All concrete facilities shall be constructed with Class B, 5 Sack mix which meets the following requirements:

Compressive Strength: 3000 psi @ 28 days
Maximum Slump: 4 inches
Lamp Black: 1 lb. / cy

In addition, Polypropylene fiber reinforcement shall be added at the following rate:

General Concrete Facilities including curb, gutter, sidewalk, access ramps, etc. – 1.5 lbs/cy (0.01% by volume), ¾ inch min. length.

Heavy Vehicular Facilities including cross gutters, spandrels, swales, and alley entrances – 3.0 lbs/cy (0.02% by volume), 1-1/2 inches min. length.

The Contractor shall be responsible for all costs associated with the required mix design. The Contractor shall comply with the “lamp black” color requirements.

2.2 DETECTABLE WARNING SURFACE

For curb ramp construction, detectable warning surfaces (DWS) shall be a cast in place style of truncated domes. No surface-applied matting systems (i.e. glued and screwed) style of DWS shall be allowed on new curb ramp construction.

For existing curb ramps and island passageways that are ADA compliant but require only a DWS, the DWS shall be cast in place style of truncated domes only. No surface-applied matting systems (i.e. glued and screwed) style of DWS shall be allowed.

The color of the DWS shall be yellow.

PART 3 – EXECUTION

3.01 GENERAL

All work shall conform to the provisions of Section 90 of the Standard Specifications. All handicap access ramps shall comply with Title 24 and current UBC requirements, as well as County Standard Details included herein.

Concrete removal work shall conform to the provisions in Section 15-1.03B, "Removing Concrete," of the State Standard Specifications and these Technical Specifications. The existing concrete shall be sawcut full depth prior to removal. Any concrete broken due to the Contractor's failure to comply with these requirements shall be removed and replaced at the Contractor's expense. All concrete removed shall become the property of the contractor to be disposed of outside the right of way, each day work occurs.

The line and grade of the replaced facilities shall conform to the existing facilities. In most instances, this will consist of a straight line between existing facilities. In instances where existing sidewalk has been raised by tree roots, Contactor shall prune tree roots. If the tree roots are greater than two inches in diameter, Contractor may adjust the line and grade or concrete thickness to avoid tree roots, as directed by the Engineer.

The Contractor shall flow line water test all repaired curbs and gutters, cross gutters, and other repaired drainage facilities in the presence of the City's Inspector.

Access ramps shall be constructed at intersections such that ramp landing falls within the limits of the striped crosswalk or just past the painted stop bar or limit line.

In situations where access ramp is retrofitted into existing sidewalk, removal and replacement for new ramp shall include sidewalk as well as adjacent curb and gutter.

In situations where an existing curb ramp is to remain, but to be retrofitted with detectable warning surface, the scope of work shall include sawcutting existing ramp surface, removing existing concrete, and replacing new concrete with truncated domes material set into new concrete. Surface applied matting systems for truncated domes (i.e. glued and screwed mats) shall not be allowed for retrofitting a detectable warning surface to an existing ramp.

3.12 PROTECTION OF EXISTING FACILITIES

The contractor shall protect existing facilities from damage, and discoloration from concrete splash. Adjacent concrete facilities shall be covered during concrete placement to prevent concrete splash and excess concrete from staining the adjacent concrete. After initial placement, strikeoff and finishing, the protection shall be removed and the adjacent concrete cleaned.

Vertical existing facilities such as light poles, walls, etc. shall be protected with plastic extending a minimum of three feet above the concrete surface. After initial placement, strikeoff and finishing, the protection shall be removed and the vertical surfaces cleaned.

Protect existing drain inlet and hood as specified on the plans. If damaged by the construction activities, the Contractor shall replace the drain inlet and hood in kind and no additional cost to the City.

3.03 SUBGRADE

After the sub-grade is prepared, moisture conditioned, and compacted to 95% relative compaction at zero to three percent over optimum moisture content, the Contractor shall continuously maintain the sub-grade in a uniform condition at the moisture content obtained during sub-grade compaction until the concrete is placed.

In locations where existing concrete improvements are being replaced, existing base material may be re-compacted and used without over excavation and placement of additional baserock. For new concrete improvements, over excavation and placement of base material in accordance with the City's Standard Details shall be required.

3.04 FORMING

Wooden forming shall be of two-inch nominal thickness staked at two foot intervals. The maximum gap at the bottom of the forms shall be 1-3/4 inches.

3.05 TOLERANCES

The maximum variation from design elevation shall not exceed +/- 0.02 feet. In some instances, particularly in critical drainage areas, tolerances may be reduced to zero. Concrete facilities shall be installed to maintain or provide positive drainage. Questions regarding applicable tolerances shall be directed to the Engineer forty-eight hours in advance of the work.

When shown on the drawings, the concrete shall be set at the design elevations. When existing facilities are to be removed and replaced, they shall conform to the existing elevations and grades. Generally, this will be at a straight line between the start and end points of the removal.

3.06 ADJUSTING UTILITY BOXES AND MANHOLES IN SIDEWALK AND RAMPS

Contractor shall refer to "Utility Structure Adjustments" Technical Specifications section.

Pull boxes located in ramp construction areas shall be replaced and set to finished grade.

3.07 PLACING AND FINISHING

The concrete shall be deposited on a moist grade in such a manner as to require as little re-handling as possible. Workmen shall not be allowed to walk in the freshly mixed concrete with boots or shoes coated with earth or foreign substances.

In general, adding water to the surface of the concrete to assist in finishing operations shall not be permitted.

Before final finishing is completed and before the concrete has taken its initial set, the edges shall be carefully finished with the radius shown on the plans or a radius to match the existing construction.

Concrete shall be thoroughly consolidated against and along the faces of all forms and adjacent concrete. After the forms are removed, excess concrete below the form surface shall be removed to be flush with the form face.

All new concrete shall match existing facilities in texture, color, and appearance. Surfaces shall

be broom finished transversely to the line of pedestrian traffic. The Contractor shall clean at his expense all discolored concrete. The concrete may be cleaned by abrasive blast cleaning or other methods approved by the Engineer. Repairs shall be made by removing and replacing the entire unit between scoring lines or joints.

3.08 CONCRETE PROTECTION

The Contractor shall always have materials available to protect the surface of the fresh concrete against rain. These materials shall consist of burlap, curing paper, or plastic sheeting. If plastic sheeting is used, it shall not be allowed to contact finished concrete surfaces.

The Contractor shall also protect the concrete against traffic and vandalism. If the concrete is damaged or vandalized, the Contractor shall make the necessary repairs at its own expense. The repair procedure for damaged or vandalized concrete shall be approved in advance by the Engineer.

3.09 CURING

Concrete shall be cured by protecting it against loss of moisture, rapid temperature change, and mechanical injury for at least three days after placement. White or clear liquid membrane compound shall be used. After finishing operations have been completed, the entire surface of the newly placed concrete shall be covered by the curing medium. The edges of the concrete exposed by the removal of forms shall be protected immediately to provide these surfaces with continuous curing treatment.

The concrete shall be allowed to cure for seventy-two hours prior to placing adjacent asphalt concrete.

3.10 JOINTS

Control joints shall be placed at a maximum spacing of ten feet.

Control joints in all PCC facilities, except sidewalks, shall be formed by tooling a deep joint or by using expansion joint material. If expansion joint material is used, a minimum of two ½ inch by 18 inch dowels shall be used with additional dowels placed every 24 inches.

Control joints in sidewalks may be made using a tooled joint which shall extend a minimum of ¼ of the depth of the concrete and shall not be less than 1-1/2 inches in depth.

In sections of new curb and gutter adjacent to an existing tree, a deep joint shall be placed through the curb and gutter, aligned with the center of the tree trunk.

Expansion joints shall be required at a maximum of forty foot intervals on curbs, curbs and gutters, cross gutters, swales, and sidewalks. Expansion joints shall also be required on all corners of curbs, curbs and gutters, sidewalks, at the outside boundary of access ramps, and other locations with discontinuities or reentrant corners which may cause cracking.

3.11 CLEANUP AND BACKFILL

After the concrete is placed, cured, and the forms have been removed, the Contractor shall clean the site of all concrete and forming debris. The aggregate base shall be replaced to match the existing base and compacted to 95% relative compaction. The pavement shall be restored in accordance with the “4-inch Base Repair (Digouts)” Technical Specification section. A minimum of two lifts shall be used, none of which shall exceed three inches, and the top lift shall be a minimum of 1-1/2 inches thick. The total thickness of the restored pavement shall match that of

the existing pavement.

For pavements to be overlaid or resurfaced, the aggregate base and asphalt concrete may be replaced with cement sand slurry in conformance with applicable County Standard Detail.

After curing has been completed and the forms have been removed from the new curb and gutter or sidewalk, the void between the new concrete and the existing parkway shall be filled with clean native material or imported topsoil and the entire parkway left in a clean and orderly condition.

For concrete removed but not replaced, the resulting void after excavation shall be backfilled with clean native material or topsoil.

3.12 DETECTABLE WARNING SURFACE (DWS)

All curb ramps shall have a detectable warning surface installed in conformance with the latest Caltrans Standards. The color of the DWS installed shall be YELLOW.

Existing curb ramps shall be removed in their entirety and replaced with a new ramp as identified on the project plans. A cast in place DWS product shall be installed at each new ramp, in conformance with these Technical Provisions. Locations for this work are identified on the project plans.

3.13 WATER VALVE LOCATING ENGRAVINGS

Contractor shall replace all water valve locating engravings located on the top and face of existing concrete curb that is to be removed and replaced. Engravings shall either be set/stamped into the finished concrete surface prior to curing, or engraved after the curing process.

The purpose of the engravings is to identify the location and offset of the existing water valves from the face of curb.

An arrow is engraved on the top of curb to point in the direction of the water valve being identified. The offset distance in feet from the face of curb shall be engraved in the face of curb in roman numerals. The engravings (arrows and roman numerals) shall be approximately 3” tall and a width of 1-2 inches.

After concrete has cured and engraving is placed, inside the engraving shall be painted blue. The paint shall only be placed within the engraved area and not on the surrounding flush concrete surface.

PART 4 – QUALITY ASSURANCE

Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

Only remove quantities of curb and gutter, sidewalk, and curb ramp that can be fully replaced with new improvements and opened to the public within five (5) calendar days.

Compressive strength and cement content for the class of Portland Cement Concrete herein designated shall be the minimum acceptable.

No concrete for concrete improvements shall be placed until the subgrade, the forms, and reinforcement have been approved.

4.01 CODES AND STANDARDS

Proportioning of Portland Cement concrete shall conform to the applicable provisions of Section 90-1.02F “Proportioning” of the State Standard Specifications.

Mixing and transporting of Portland Cement Concrete shall conform to the applicable provisions of Section 90-1.02G “Mixing and Transporting Concrete” of the State Standard Specifications.

Curing of Portland Cement Concrete shall conform to the applicable provisions of Sections 90-1.03B(3) “Curing Compound Method” of the State Standard Specifications.

Protection of Portland Cement Concrete shall be provided in conformance with the applicable provisions of Section 90-1.03C “Protecting Concrete” of the State Standard Specifications.

Forming of concrete for improvements shall conform to the provisions of Section 73-1.03C “Fixed Form Method” of the State Standard Specifications forming for cast-in-place structures shall conform to Section 51-1.03C(2) “Forms” of the State Standard Specifications.

Placing of concrete improvements shall conform to the provisions of Sections 73-2 “Curbs” and 73-3 “Sidewalks, Gutter Depressions, Island Paving, Curb Ramps, and Driveways” of the State Standard Specifications; placing of concrete for cast-in-place concrete structures shall conform to Section 51-1.03 “Construction” of the State Standard Specifications.

Finishing of cast-in-place concrete structures shall conform to the provisions of Section 51-1.03F “Finishing Concrete” of the State Standard Specifications. Finishing of concrete improvements shall conform to Section 73 of the Standard Specifications. Unless otherwise called for on the plans, all buried surfaces shall have “Ordinary Surface Finish” all exposed surfaces shall have “Class 1 Surface Finish”.

Placing and splicing of steel reinforcement shall conform to the requirements of Section 52-1.03D “Placing” of the State Standard Specifications.

4.02 CERTIFICATIONS

At the time of delivery provide certificates of compliance signed by both Contractor and Supplier containing the following statements:

a. Materials supplied comply with the specification in all respects.
b. Proportioning and mixing is in compliance with a design mix which has been field tested in accordance with the herein requirements and produces the required compressive strength under like conditions.
c. Statement of type and amount of any admixtures.
d. All certificates shall include the Material and Supplier’s mix design number.

At time of delivery provide certified delivery ticket stating volume of concrete delivered and time of mixing, or time of load-out in case of transit mixers.

4.03 JOB CONDITIONS

Admixtures shall not be used except upon the prior written permission of the Engineer and, if permitted, the concrete containing same will be subject to the same compliance testing as herein specified for the various classes of concrete.

Temperature of mixed concrete, immediately prior to placement, shall not be less than 50° F, nor more than 90°F. Aggregates and water shall be heated or cooled at the mixing plant by supplier as necessary to produce concrete within these limits. Neither aggregates nor mixing water shall be

heated to exceed 150°F.

No additional mixing water shall be incorporated into the concrete during transport or after arrival at the work site unless such water is specifically authorized by the Engineer. If authorization to add mixing water is obtained and mixing water is added to the mix, the mixer drum shall then be revolved a minimum of thirty (30) revolutions.

Hand mixing of Portland Cement Concrete shall not be allowed except upon prior written approval. Where a portion of existing concrete improvements is to be reconstructed, the section to be removed shall first be a cut with an approved concrete saw to a minimum depth of one-half the depth of the existing concrete at the first score line beyond the area to be replaced.

Where concrete removal is required, it shall be removed to the nearest score line of joints.

Prior to placing concrete for concrete structures, Contractor shall first secure approval of the forms and any required reinforcement.

4.04 QUALITY CONTROL

Do not commence placement of concrete until mix designs have been reviewed and approved by the Engineer.

4.05 SUBMITTALS

Within 14 calendar days after the Contractor has received the Notice to Proceed, the Contractor shall submit the concrete mix design for all items of work.

At bioretention areas, the cut-off curbs shall connect on each side of the bioretention area. Typically the Cut-off Curb (Type 2) is parallel to the right-of-way line. The Cut-Off Curb wraps around the street side of the bioretention area and connects to the Type 2 cut-of curb. Contractor shall submit working drawing of cut-off curbs at each bioretention area. Working drawing shall show the limits of each type of cut-off curb, location of water stop(s), and indicate vertical and sloped curb faces. Both faces of the top portion of the curb may be sloped.

PART 5 – PRODUCTS

5.01 AGGREGATE FOR PORTLAND CEMENT CONCRETE

Aggregates for Portland Cement Concrete shall conform to the requirements of Section 90-1.02C “Aggregates” of the State Standard Specification.

Unless otherwise specified or called for on the plans for the work, aggregate size and gradation for Portland Cement Concrete shall conform to the requirements of Section 90-1.02C(4)(d) “Combined Aggregate Gradation” of the State Standard Specifications for one inch (1”) maximum combined aggregate.

5.02 WATER FOR PORTLAND CEMENT CONCRETE

Water for mixing and curing concrete and for washing aggregates shall conform to the requirements of Section 90-1.02D “Water” of the State Standard Specifications.

5.03 CEMENT FOR PORTLAND CEMENT CONCRETE

Cement for Portland Cement Concrete to be placed in roadway improvements such as curbs, gutters, walks, valley gutters, driveways, surface and subsurface pads or slabs shall be Type V or

Type II (modified) cement conforming to the requirements of ASTM Designation C150, with the following modifications:

1. The cement shall not contain more than 0.60% by weight of alkalies, calculated as the percentage of Na20 plus 0.658 times the percentage of K20 when determined by either direct 4 intensity flame photometry or by the atomic absorption method. The instrument and procedure used shall be qualified as to precision and accuracy in accordance with the requirements of ASTM Designation C114.
2. The autoclave expansion shall not exceed 0.50%.
3. Mortar, containing the Portland Cement to be used and the sand, when tested in accordance with Test Method No. Calif 527, shall not expand in water more than 0.010% and shall have an air content less than 048%.
4. Allowable tri-calcium Aluminate (C3A) by weight shall not exceed 5%. Allowable tetracalcium alumino ferrite plus twice the tricalcium aluminate (C4AF+2C3A) by weight shall not exceed 25%. The sulfate expansion test (ASTM C452) may be used in lieu of the above chemical requirements, provided the sulfate expansion does not exceed 0.040% at 14 days (max).
5. The Contractor may substitute pozzolan for Portland Cement in amounts up to 15% of the required mix unless high early strength concrete is specified. Pozzolan shall consist of Class F fly ash meeting the requirements of ASTM C618.

Cement for Portland Cement Concrete to be placed in surface improvements shall contain a coloring compound equivalent to ¼ pound of lampblack per cubic yard, added to the concrete at the central mixing plant.

Liquiblack, as supplied by Concrete Corporation of Redwood City, California, may be used in lieu of lampblack. One pint of liquiblack shall be considered equal to one pound of lampblack.

5.04 CLASSIFICATION OF PORTLAND CEMENT CONCRETE

Portland Cement Concrete shall be minor concrete conforming to the requirements of Section 90-2 “Minor Concrete” of the State Standard Specifications with at least 505 pounds of cementitious material per cubic yard and 1-inch maximum graded coarse aggregate. No bagged mix is permitted.

Portland Cement Concrete not conforming to the above classification or having required minimum compressive strengths other than those set forth above, shall conform to requirements to be set forth for same noted on the plans or detail drawings.

5.05 EXPANSION JOINT MATERIAL

Material for expansion joints in Portland cement concrete improvements shall be pre-molded expansion joint fillers of the thickness called for on the plans and conforming to the requirements of ASTM Designation D1751. Expansion joint material shall be shaped to fit the cross section of the concrete prior to being placed. Suppliers certificates showing conformance with this specification shall be delivered with each shipment of materials delivered to the job site.

5.06 REINFORCEMENT AND DOWELS

Bar reinforcement for concrete improvements shall be deformed steel bars of the size or sizes called for on the plans conforming to the requirements of ASTM Designation A615 for Grade 60 bars. Size and shape for bar reinforcement shall conform to the details shown or called for on the plans.

Slip dowels, where noted or called for on the plans or detail drawings shall be smooth billet-steel bars as designated and conforming to the requirements of ASTM Designation A615 for Grade 60 bars. Ends of bars inserted in new work shall be covered with a cardboard tube sealed with cork;

no grease or oil will be used.

Mesh for reinforcement for concrete improvements shall be cold drawn steel wire mesh of the size and spacing called for on the plans conforming to the requirements of ASTM Designation A82 for the material and ASTM Designation A185 for the mesh. Size and extent of mesh reinforcement shall conform to the details shown or called for on the plans.

Tie wire for reinforcement shall be eighteen (18) gauge or heavier black annealed conforming to the requirements of ASTM Designation A82.

Suppliers certificates showing conformance with this specification shall be delivered with each shipment of materials delivered to the job site.

5.07 ACCESSORY MATERIALS

Materials for water stops and other items required in the placement of Portland Cement Concrete shall conform to the applicable requirements of Section 51 of the State Standard Specifications unless otherwise specifically noted or called for on the plans or detail drawings.

Curing compound for use on exposed surfaces of Portland Cement Concrete shall be “Non-Pigmented Curing Compound – chlorinated Rubber Base-Clear” conforming to the requirements contained in 90-1.03B(3) “Curing Compound Method” of the State Standard Specifications.

5.08 MATERIAL FOR FORMS

Material for forms for cast-in-place concrete shall conform to the requirements of Section 51-1.03C(2) “Forms” of the State Standard Specifications.

5.09 CONCRETE FOR CURBS/GUTTERS, CURB RAMPS, VALLEY GUTTERS

All concrete shall conform to the applicable County Standard Drawings and Specifications unless otherwise specified herein. In addition, the Concrete mix shall have 1” maximum combined aggregate grading.

Portland cement: ASTM C150 Type I or II. 6-sacks cement minimum per cubic yard, 2 pints of liquid lampblack, per cubic yard.

Water shall be clean, free from injurious amounts of oil, alkali, organic matter or other deleterious material. 6 gallons water maximum per sack cement.

Aggregate: ASTM C33 – clean, hard, durable, uncontaminated, washed, graded, cleaned and screened. Crusher run or bank run gravel will not be permitted.

The concrete mix for the replacement of concrete street slabs and valley gutters shall conform to Section 105.

All concrete shall have a slump of 3” to 4” and shall obtain at least 3500 psi strength at 28 days. Concrete mix shall be such that the new concrete structure can be opened to vehicular traffic within three (3) calendar days from the time of placement without damaging the new concrete.

Lamp black content shall be of an approved quality mixed at the rate of two (2) pints of liquid per cubic yard of concrete for curb & gutter, sidewalks, and curb ramps.

5.10 AGGREGATE BASE

Aggregate Base shall be Class II and conform to the applicable requirements set forth in the San

Mateo County Standard Drawings

5.11 TOP SOIL

Soil to be used in planter areas between curbs and sidewalks shall be fertile, well-drained, of uniform quality, free from stones over 1" diameter, sticks, oils, chemicals, plaster, concrete, and other deleterious materials.

Top soil shall conform to Caltrans Standard Specifications, Section 20- 2.01.

5.12 DETECTABLE WARNING SURFACES (TRUNCATED DOME)

All curb ramps shall have a detectable warning surface installed in conformance with the latest Caltrans Standards. The color of the DWS installed shall be YELLOW.

Existing curb ramps shall be removed in their entirety and replaced with a new ramp as identified on the project plans. A cast in place DWS product shall be installed at each new ramp, in conformance with these Technical Provisions. Locations for this work are identified on the project plans.

PART 6 – EXECUTION

GENERAL

Contractor shall stake the location of expansion joints for driveways and curb returns at least three days prior to installing forming for concrete sidewalks, curbs, gutters, etc. Engineer shall approve locations of expansion joints prior to forming activities.

The demolition of the existing concrete including curb and gutter, sidewalk, and curb ramps shall proceed as detailed in Section 105 Concrete Improvements of these Specifications.

The Contractor shall lower or replace any water service lines encountered while excavating or grading for the sidewalk and curb & gutter work as directed by the Engineer.

The Contractor shall place a minimum of six (6) inches of Class 2 aggregate base beneath new concrete improvements or where existing concrete is removed and replaced unless otherwise stated in these Project Specifications. Excavate, re-grade, provide, and install additional base material as necessary to obtain six (6) inches minimum in areas where existing improvements are being removed. Before placing new base or replacing existing material, sub- grade material shall be compacted to minimum of 90% relative compaction. The base material shall be compacted to a minimum of 95% relative compaction as determined by ASTM Tests D1557, D2922 and D3017.

Forms shall be checked and approved by the Engineer or City Inspector before any placement of concrete.

Dowel new concrete into existing concrete with ½"-diameter, 12"-long dowels at two feet on center, epoxied and embedded six inches. At expansion joints and at end of pours, use ½"-diameter, 12"-long dowels, smooth and capped, to tie into adjacent concrete. Dowel holes shall be drilled into the existing sidewalk or curb without causing damage.

Concrete shall not be placed when air temperature is below 40°F or during rain or within two hours before sunset. No on-site mixing of concrete shall be allowed.

Concrete shall be placed and compacted in forms without segregation. After placement, the concrete

shall be consolidated sufficiently to produce a dense mass, struck off and floated. Final finishing operations shall not proceed until all bleed water has evaporated from the surface. Sprinkling of dry cement to absorb excessive surface moisture shall not be allowed. The surface texture of finished concrete shall conform to adjacent concrete. Forms shall not be removed less than twenty-four hours after the concrete has been placed. In no event shall forms be removed while the concrete is sufficiently plastic to slump.

As soon as the concrete is set, it shall be cured for a period of at least 72 hours by spraying with an accepted pigmented impervious membrane curing compound.

The Contractor shall restore any landscaping, irrigation system, and special surface treatments encountered in the execution of this Work to a condition equivalent or better than that which existed prior to the commencement of this Work. The above shall include but not be limited to:

- Brickwork
- Landscaping and irrigation systems
- Painting of curbs if a designated color exists, such as a “red zone”

The Contractor shall notify residents of driveway closures due to construction per Section 103 Traffic Control of these Specifications. After excavation, the Contractor shall provide temporary access to the driveways for residents during weekend or holiday periods if the forms have not been set, by either placing aggregate base or by utilizing steel plates.

The Contractor shall protect all completed Work from damage. All discolored concrete shall be cleaned to a uniform color. Repairs and cleaning of new concrete shall be at the expense of the Contractor.

The Contractor shall compact all new asphalt concrete, base material, and topsoil related to the concrete work described herein according to the Specifications. All costs for furnishing, placing and compacting these materials shall be included in the price for the Work.

The Contractor shall ensure that the site is left in a safe condition from loose lumber, nails, etc.

All sidewalk, curb and gutter, curb ramp, and entrance walks to be removed and replaced are as shown on the Plans.

All concrete shall be placed against existing sawcut concrete or 2” thick wood forms. When pouring new gutters, 12 inches of adjacent pavement shall be removed beyond the lip of gutter to allow for the placement of forms. No concrete shall be placed against asphalt or spalled, chipped or broken concrete.

At locations where new curb ramps are to be installed, 12 inches of adjacent pavement shall be removed at the lip of gutter to allow for the placement of forms.

The Contractor shall temporarily plug the gap between existing pavement and new concrete structures with cut back asphalt or asphalt concrete before opening the concrete structure to the public. Before the final paving, the plug material between existing pavement and new concrete structure shall be removed completely. The subgrade material shall be compacted to 95% relative compaction, then the gap shall be paved back with material in kind.

All existing expansion joints shall be replaced in the valley gutters, curb and gutter. Expansion joints shall be placed at right angles to the curb line and extend through the entire thickness of the concrete. Concrete adjacent to expansion joints shall be finished with an edger tool. Contraction joints scored a minimum of 1 ½” shall be constructed at intervals not to exceed 20 feet in the

sidewalk, curb and gutter. The width of contraction joints shall not exceed 1/8", and the edges of contraction joints shall be finished with a "T" bar. All joints shall be scored at right angles to the curb line. Score marks shall be uniform with those in the adjacent concrete. All score marks shall be ¼" in depth and left in a cleanly rounded condition.

The Contractor shall stamp the name of the street on top of the curb, at the location where the street name was removed as part of the concrete removal and replacement.

The Contractor shall check grades to ensure drainage at every corner return where new curb and gutter and curb ramps are installed. Finished areas with drainage problems shall be removed and replaced at the expense of the Contractor.

Curb ramps shall have a detectable warning surface that extends the full width and 3 feet depth of the curb ramp. The edge of the detectable warning surface nearest the street shall be between 6" and 8" from the gutter flowline. Curb ramps with raised truncated domes shall conform to Caltrans Standard Plans Curb Ramp Detail No. A88A and Caltrans Standard Specifications. Refer to the County's Standard Drawings for other curb ramp details.

For retrofit curb ramp conditions, the location of the truncated dome panel shall be approved by the Engineer prior to installation. Adhere to the manufacturer's installation instructions. The Contractor shall grind the area to receive the detectable warning surface to make the finished surface flush with the surrounding surface. The area shall be cleaned of dust and debris before installation of the detectable warning surface.

6.01 STRUCTURAL EXCAVATION

Structural excavation may be either by hand, or by machine and shall be neat to the line and dimension shown or called for on the plans. Excavation shall be sufficient width to provide adequate space for working therein and comply with CAL-OSHA requirements.

Where an excavation has been constructed below the design grade, the bottom of the excavation shall be backfilled to grade with approved material and compacted in place to 95% of the maximum dry density.

Surplus excavation material remaining upon completion of the work shall be either removed from job site, or conditioned to optimum moisture content and compacted as fill at the site.

6.02 BRACING AND SHORING

The Contractor shall furnish, place and maintain such bracing and shoring as may be required to support the sides of the excavations for the proper protection to workmen; to facilitate the work; to prevent damage to adjacent structures or facilities. Upon completion of the work, all bracing and shoring shall be removed, unless otherwise directed.

The Contractor is solely responsible for all bracing and shoring and shall, if required, submit an application and supporting data for an effective shoring system to the Engineer. The Engineer may forward the application to the California Division of Industrial Safety for design, assumed soils conditions, and the estimation of forces to be resisted, together with plans and specifications of the materials and methods to be used. The application shall be prepared by a Civil Engineer registered in California. No excavation around cast-in-place concrete structures shall proceed until the Contractor has received the return of an approved application, if required.

Contact Engineer if Shoring in Bay Mud Conditions.

6.03 FORMS FOR CONCRETE

Concrete improvements shall be formed with a smooth and true upper edge and the side of the form shall be placed next to concrete with a smooth finish. Forms shall be constructed or made rigid enough to withstand the pressure of the fresh concrete to be placed without any distortion.

All forms shall have been thoroughly cleaned prior to placement and shall be coated with an approved form oil sufficient to prevent adherence of concrete prior to placing.

Forms shall be carefully set to the alignment and grade established and shall conform to the required dimensions. Forms shall be rigidly held in place by stakes set at satisfactory intervals. Sufficient clamps, spreaders and braces shall be installed to ensure the rigidity of the forms.

Forms for back and face of curbs, lip of gutters and edge of walks, valley gutters or other surface slabs shall be equal to the full depth of the concrete as shown, noted or called for on the plans or detail drawings. Composite forms made up from benders or thin planks of sufficient ply to ensure rigidity of the form in the shape required may be used on curves and curb returns.
No concrete shall be placed until the Engineer has inspected and approved the forms and subgrade. Concrete is subject to rejection without approval by the Engineer.

6.04 PLACING STEEL REINFORCEMENT

Bars shall be free of mortar, oil, dirt, excessive mill scale and scabby rust and other coatings of any character that would destroy or reduce the bond. All bending shall be done cold, to the shapes shown on the plans. The length of lapped splices shall be as follows:
Reinforcing bars No. 8, or smaller, shall be lapped at least 45 bar diameters of the smaller bar joined, and reinforced bars Nos. 9, 10, and 11 shall be lapped at least 60 bar diameters of the smaller bars joined, except when otherwise shown on the plans.
Splice locations shall be made as indicated on the plans.

Reinforcement shall be accurately placed as shown on the plans and shall be firmly and securely held in position by wiring at intersections and splices and by using precast mortar blocks or ferrous metal chairs, spacers, metal hangers, supporting wires, and other approved devices of sufficient strength to resist crushing under applied loads. Supports and ties shall be such as to permit walking on reinforcing without undue displacement.

Reinforcing shall be placed so as to have the following minimum concrete cover:

- Surfaces exposed to water 4”
- Surfaces poured against earth 3”
- Formed surfaces exposed to earth or weather 2”
- Slabs, walls, not exposed to weather or earth 1”

Minimum spacing, center of parallel bars shall be two and one half (2-1/2) times the diameter of the larger sized bar. All reinforcing shall be securely tied in place prior to pouring concrete. Placing of dowels or other reinforcing in the wet concrete is not permitted.

6.05 MIXING CONCRETE

All concrete shall be transit mixed in accordance with the requirements of ASTM Designation C94. Transit mixed concrete shall be mixed for not less than ten (10) minutes total, of which not less than three (3) minutes shall be on the site just prior to pouring. Mixing shall be continuous with no interruptions from the time the truck is filled until the time it is emptied. Concrete shall be placed within one hour of the time water is first added.

Hand mixing of concrete for use in concrete structures will not be permitted.

6.06 PLACING CONCRETE

Subgrade shall be thoroughly wetted prior to the placing of concrete for all concrete placed directly on soil. All standing water shall be removed prior to placing of concrete.

No concrete shall be placed until the subgrade and the forms have been approved.

Concrete shall be conveyed from mixer to final location as rapidly as possible by methods preventing separation of the ingredients. Deposit concrete as nearly as possible in final position to avoid re-handling.

Concrete shall be placed and compacted in forms without segregation by means of mechanical vibration or by other means as approved by the Engineer. Vibration shall continue until the material is sufficiently consolidated and absent of all voids without causing segregation of material. The use of vibrators for extensive shifting of fresh concrete will not be permitted.

All control and construction joints shall be as shown on the plans.

Concrete in certain locations may be pumped into place upon prior approval. When this procedure requires redesign of the mix, such redesign shall be submitted for approval in the same manner as herein specified for approval of design mixes.

6.07 FORM REMOVAL

Forms shall be removed without damage to concrete. All forms below the ground surface, together with all shores and braces, shall be removed before backfilling.

Backfill against concrete shall not commence until the concrete has developed sufficient strength to prevent damage.

Forms with cast-in-place walls shall remain in place at least 72 hours after pouring.

Forms with suspended slabs shall remain in place at least 28 days after pouring.

Edge forms shall remain in place at least 24 hours after pouring.

6.08 EXPANSION JOINTS

Expansion joints incorporating pre-molded joint fillers shall be constructed at twenty (20) foot intervals in all concrete curbs, gutters and sidewalks, cut-off curbs, and at the ends of curb returns. At each expansion joint, one-half by twelve inch (1/2” x 12”) smooth slip dowels shall be installed in the positions shown or noted on the detail drawings.

Slip dowels shall be oriented at right angles to the expansion joint and shall be held firmly in place during the construction process by means of appropriate chairs.

Expansion joints and slip dowels shall be constructed in valley gutters and driveway approaches in the positions indicated or called for on the detail drawings.

6.09 CONTROL JOINTS

Control joints shall be constructed in concrete curbs, gutters, walkways and pavements between expansion joints at ten (10) foot intervals throughout, or as shown on the plans. Depth of joint score shall be a minimum of one-fourth (25%) the thickness of the concrete.

6.10 FINISHING

Concrete curb and gutter shall be finished in conformance with the applicable requirements of Section 73-1.04 and 73-1.05A of the State Standard Specifications as modified herein.

Where monolithic curb, gutter and sidewalk is specified, separate concrete pours will not be allowed.

Horizontal surfaces shall receive a medium broom finish unless otherwise shown.

New work shall match existing in finish, score pattern, and color.

6.11 ROADWAY ACCESSORY CONSTRUCTION

Concrete walkways, island paving, valley gutters and driveway approaches shall be formed, placed and finished in conformance with the applicable requirements of Sections 73-2 “Curbs” and 73-3 “Sidewalks, Gutter Depressions, Island Paving, Curb Ramps, and Driveways” of the State Standard Specifications as modified herein.

Where new concrete curb and gutter is to be constructed against existing AC remove 12” of the AC to form new gutter lip. Patch pave after gutter form is removed.

6.12 CONNECTING TO EXISTING CONCRETE IMPROVEMENTS

Whenever new curb, gutter, or sidewalk is to connect to existing improvements to remain, sawcut to existing sound concrete at the nearest score line or expansion joint. Drill and insert ½” diameter by 12” long dowels at 24” on center into existing improvements. Install pre-molded expansion joint filler at the matching joint.

A “cold” joint to the existing curb, gutter or sidewalk is not permitted.

6.13 FIELD QUALITY CONTROL

Finish subgrade for concrete improvements shall be subject to approval prior to placement of forms.

No concrete shall be placed prior to approval of forms.

Appearance and finish of all concrete improvements constructed shall not contain “bird baths” or pond water and shall be smooth and ridge free.

Finish grade at top of curb, flow line of gutter, and the finish cross section of concrete improvements shall conform to the design grades and cross sections.

Variation of concrete improvements from design grade and cross section as shown or called for on the plans shall not exceed the tolerances established in Sections 73-1.05 and/or 73-1.06 of the State Standard Specifications, as applicable.

6.13 RESTORATION OF EXISTING IMPROVEMENTS

Existing pavement or other improvements removed or damaged due to the installation of concrete improvements shall be replaced in kind.

Existing landscaping or planting removed, damaged or disturbed due to the installation of concrete improvements shall be replaced in kind.

6.14 CLEANUP

Surplus material and debris remaining upon completion of the work shall be segregated as to type, and transported from the job site and disposed of in a legal manner.

END OF SECTION 105

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SECTION 106

ASPHALT CONCRETE GRINDING

PART 1 – GENERAL

Work covered by this section includes “cold planning” operations of existing pavement. Work shall be in conformance with Section 39-3.04 of the State Specifications and the County Standard Specifications as modified herein.

PART 2 – MATERIAL AND EQUIPMENT

Grinding shall be performed with abrasive grinding equipment utilizing diamond cutting blades. Except on structures, the entire area of pavement in locations designated shall be ground. Removal by heater planning shall not be allowed.

Due to multiple street segment locations across the City, the Contractor shall have a minimum of one power sweeper with vacuum for each grinder.

PART 3 – EXECUTION

3.01 GENERAL

The depth, width and shape of the cut shall be as indicated on the plans or as directed by the Engineer. All tapered or otherwise non-vertical edges must be saw cut or jack hammered to provide a straight, vertical edge. The final cut shall result in a uniform surface conforming to the plans. The underlying pavement surface to remain in place shall not be damaged in any way.

The material planed from the roadway surface, including material deposited in existing gutters or on the adjacent traveled way, shall be immediately removed from the site of the work and disposed of, unless otherwise directed by the Engineer. All material removed by grinding, including pavement fabric (if present), shall be cleaned up and legally disposed of outside of the City limits. Recycling of the material is encouraged in compliance with the City recycling ordinance. Contractor shall place and maintain warning signs and temporary AC patch material to serve as “ramps” at all pedestrian and vehicular crossings over entire length of grinding. Final overlay of milled surfaces shall occur no later than seven (7) calendar days after the completion of grinding operations.

The Contractor shall notify the Engineer immediately upon discovering pavement fabric and anytime that the limits of the fabric are reached so that the Engineer can measure limits properly.

Care shall be taken to avoid damage to adjacent improvements including adjacent asphalt surfacing that is to remain in place. The Contractor shall be responsible for the cost of repairing damage to any facility caused by the grinding operations. Loops and/or wiring intended to be saved but damaged by the Contractor during grinding operations shall be replaced at his expense. The Contractor shall protect all existing valve covers and other existing structures during the grinding operation.

WORKING HOUR RESTRICTIONS – To ensure that the roadway will be opened in time so as not to impact peak traffic, all grinding operations shall be shut-down and cleared for traffic by 3:00 pm each day, unless a later time is allowed, at the sole discretion of the Engineer, based upon his assessment of how long clean-up and temporary AC conforms will take. Engineer shall be given two (2) hours notice for request review and approval/disapproval.

Any utility covers compromised and in need of replacing, during the grinding operation, shall be brought to the immediate attention of the Engineer.

Contractor shall protect monument markers within the street monument boxes during grinding. Any damage to monument markers within the monument boxes during grinding shall be repaired at the expense of the Contractor with no additional expense to the City.

Contractor shall use sweeper to mitigate dust during grinding operations.

PART 4 – MEASUREMENT AND PAYMENT

Included in Section 100 of these Technical Specifications.

END OF SECTION 106

SECTION 107

HMA PAVING AND BASE REPAIR

PART 1 – GENERAL

3.12 SUMMARY

This work includes producing and placing hot mix asphalt (Type A) using the STANDARD process, comply with Section 39, “Hot Mix Asphalt,” of the latest State Standard Specifications except where modified herein.

Work covered by this section includes digout and repair of failed asphalt concrete pavement.

Submit Job Mix Formulas (JMF) and JMF production testing results.

1.02 SUBMITTALS

Contractor shall submit certificates from materials suppliers stating compliance with the requirements of this Section.

1.03 COORDINATION

At some locations, base repairs are specified to address damage due to tree roots. Contractor shall obtain approval from a licensed arborist prior to cutting, pruning or removing any tree roots while performing base repairs.

PART 2 – MATERIALS

2.01 AGGREGATE

Asphalt concrete shall be Type A conforming to the ½ inch maximum size aggregate for base courses and ½ inch maximum for surface courses as specified in Section 39-1.02E , “Aggregate” of the State Standard Specifications. Paving completed in a single lift placement shall be constructed with ½ inch maximum size aggregate for HMA.

Asphalt concrete used for “Leveling Courses” shall be Type A conforming to 3/8 inch maximum, medium surface courses, as specified in Section 39-1.02E, “Aggregate” of the State Standard Specifications.

Asphalt concrete used for base repair shall be Type A, ½ inch maximum, medium graded aggregate material conforming to Section 39, State Standard Specifications.

2.02 ASPHALT BINDER

Asphalt binder to be mixed with the aggregate shall conform to the provisions of Section 92 of the State Standard Specifications and shall be paving asphalt grade PG 64-10, unless otherwise directed by the Engineer. The amount of asphalt binder to be mixed with the aggregate shall be determined by the supplier in accordance with the requirements of California Test 367. The mix design, job mix formula and certificate of compliance for the asphalt binder shall be submitted for approval at least 10 working days prior to the start of work.

2.03 ASPHALT TACK COAT

Tack coat (paint binder) shall conform to the requirements of Section 94, “Asphaltic Emulsions” of the State Specifications for Grade SS-1h, CSS-1h, QS-1h, or CQS-1h.

PART 3 – EXECUTION

3.01 GENERAL

The surface of the pavement to receive asphaltic concrete shall be swept clean of all soil, vegetation and debris with a self propelled pick-up street broom machine immediately prior to placement of the asphalt tack coat.

Asphalt concrete shall be spread with an asphaltic paving machine. Paving machine shall be self-propelled mechanical spreading and finishing equipment provided with an automatic screed control.

Compaction shall be obtained by approved means to obtain the specified density and surface finish to the lines, grades and cross section shown on the plans. Asphalt concrete shall be compacted to a minimum 92 percent of the maximum theoretical density.

Where the total thickness of asphalt concrete to be placed is greater than 3 inches it shall be placed in lifts conforming to Sections 39-1.10 “Spreading and Compacting Equipment” of the State Standard Specifications. Asphalt concrete for base repair shall be placed and compacted in two layers. The final layer shall not be less than one and one-half (1-1/2) inches in compacted thickness nor more than three (3) inches. Spreading and compacting of asphalt concrete shall conform to the applicable provisions of Section 39 of the State Standard Specifications. The width of the compaction equipment should be narrow enough to fit within the repair area.

Installation of leveling course shall be conforming to Section 39-1.11 “Transporting, Spreading, and Compacting” of the State Standard Specifications.

Pavement joints are to be at the lane line locations wherever possible. Pavement joints shall not be placed in travel lanes. The automatic screed control shall include a mobile grade reference (ski type), or equivalent and provision for automatic control of transverse slope. Longitudinal paving joints at the end of paving shifts shall be avoided, unless approved by the Engineer. The Contractor shall schedule his paving operations such that each layer of asphalt concrete is placed on all contiguous lanes of a traveled way each work shift. At the end of each work shift, the distance between the ends of the layers of asphalt concrete on adjacent lanes shall not be greater than 10 feet nor less than 5 feet. Additional asphalt concrete shall be placed along the transverse edge at the end of each lane and along the exposed longitudinal edges between adjacent lanes, hand raked, and compacted to form temporary conforms. Kraft paper, or other approved bond breaker, may be placed under the conform tapers to facilitate the removal of the taper when paving operations resume.

At road connections designated by the Engineer, additional asphalt concrete surfacing material shall be placed and hand raked, if necessary, and compacted to form smooth tapered connections. The Contractor is further advised that it will be his responsibility to assure that the existing drainage patterns are to be maintained at all locations or as directed by the Engineer.

The area to which tack coat has been applied shall be closed to public traffic. Care should be taken to avoid tracking binder material onto existing pavement surfaces beyond the limits of construction.

Asphalt concrete surfacing shall be placed on all existing surfacing shown on the plans, unless otherwise directed by the Engineer.

The locations of failed areas needing digout repair shall be marked in the field by the Contractor, as noted on plans. The City shall approve and/or modify the location of each marked pavement area prior to allowing the Contractor to proceed with pavement digout removal.
Asphalt concrete shall be removed to a total depth as shown on plan from the top of grinded

surface. Digouts shall be completed after the full road width grind operation. If saw-cutting is used to repair failed areas it shall be performed with a diamond saw blade along the dimensions indicated, extending the entire depth of the existing asphalt concrete.

If a cold milling machine (grinder) is used, payment will be made for the actual square footage of base repaired, not exceeding the limits marked by the Engineer. The Contractor shall provide vertical edges on all sides of the digout area prior to placement of HMA. Contractor shall saw cut any grinder rolled edges, if needed, and remove the necessary AC to create the required vertical edges.

The material grindings from the roadway surface, including material deposited in existing gutters or on the adjacent traveled way, shall be immediately removed from the site of the work and disposed of, unless otherwise directed by the Engineer. All material removed by grinding, including pavement fabric (if present), shall be cleaned up and legally disposed. Recycling of the material is encouraged in compliance with the City recycling ordinance. All materials removed from repair areas shall be legally disposed of outside the City limits.

Base repair work shall not commence unless the ambient temperature is above 50 degrees F and has not been below 35 degrees F during the previous twelve (12) hours. Prime or tack coats shall not be applied when the surface to be coated is wet or contains an excess of moisture. The temperature of asphalt concrete shall not be less than 250 degrees F during initial spreading.

Any utility covers compromised and in need of replacing, during the paving operation, shall be brought to the immediate attention of the Engineer.

Traffic shall not be allowed on the HMA pavement until final rolling operations are completed, and pavement temp is below 160°F.

3.12 TOLERANCE

The finished surface of the asphalt pavement shall conform to the smoothness tolerances as stipulated in Section 39-1.12D “Smoothness Corrections” of the State Standard Specifications. Areas of pavement which fail to meet smoothness tolerances shall be repaired by fine surface grinding at no additional cost to the City. Should the methods and equipment furnished by the Contractor fail to produce a layer of asphalt concrete conforming to the requirements, including straightedge tolerance, of Section 39 of the State Specifications, the paving operations shall be discontinued and the Contractor shall modify his equipment or furnish substitute equipment which will produce the desired results.

At the discretion of the Engineer, the asphalt concrete may be tested for thickness based on the same cores taken for compaction to determine if pavement thickness conforms to the nominal thickness specified in the contract. The allowable deviation for pavement thickness shall be plus or minus (±) one-eighth (1/8) inch. All core holes shall be filled with mortar with the top two (2) inches compacted with hot asphalt or Hydro mix. Cold asphalt or cutback will not be allowed.

3.03 TESTING

Field compaction testing will be provided by the City. Contractor shall be responsible for retesting as required.

All tests identified in Section 39 of the Standard Specifications for the STANDARD construction process of HMA shall be completed by an independent, third party, testing laboratory/contractor.

The independent, third party, testing laboratory determines the percent of maximum theoretical density from density cores taken from the final layer or full layer thickness if placed in single layer, whichever is applicable. Take three (3) density cores for every 500 tons or once per day of

HMA/RHMA placed, whichever is less. The Engineer determines a deduction for percent of maximum theoretical density based on the average of three density cores using the reduced payment factors in the following table:

Reduced Payment Factor for Percent of Maximum Theoretical Density

HMA Type A and B and RHMA-G percent of maximum theoretical density	Reduced payment factor	HMA Type A and B and RHMA-G percent of maximum theoretical density	Reduced Payment Factor
92.0	0.0000	97.0	0.0000
91.9	0.0125	97.1	0.0125
91.8	0.0250	97.2	0.0250
91.7	0.0375	97.3	0.0375
91.6	0.0500	97.4	0.0500
91.5	0.0625	97.5	0.0625
91.4	0.0750	97.6	0.0750
91.3	0.0875	97.7	0.0875
91.2	0.1000	97.8	0.1000
91.1	0.1125	97.9	0.1125
91.0	0.1250	98.0	0.1250
90.9	0.1375	98.1	0.1375
90.8	0.1500	98.2	0.1500
90.7	0.1625	98.3	0.1625
90.6	0.1750	98.4	0.1750
90.5	0.1875	98.5	0.1875
90.4	0.2000	98.6	0.2000
90.3	0.2125	98.7	0.2125
90.2	0.2250	98.8	0.2250
90.1	0.2375	98.9	0.2375
90.0	0.2500	99.0	0.2500
<90.0	Remove and Replace	>99.0	Remove and Replace

Testing of hot mix asphalt shall comply to the testing requirements identified in the “Hot Mix Asphalt” Technical Specifications section.

3.04 DAMAGE REPAIR

The Contractor shall be responsible for any damage to existing curbs, gutters, sidewalks and driveways and any asphalt concrete, liquid asphalt or asphaltic emulsion stains occurring during the course of this Contract. Such damage shall be cleaned by a method satisfactory to the Engineer. The cost of repairing this damage shall be considered as included in the unit price paid for asphalt concrete and no additional compensation shall be allowed.

3.05 PUBLIC CONVENIENCE AND STAGING

Schedule paving operations such that each layer of asphalt concrete is placed on all contiguous lanes of a traveled way each work shift. At the end of each work shift, the distance between the ends of the layers of asphalt concrete on adjacent lanes shall not be greater than 10 feet nor less than 5 feet.

Place additional asphalt concrete along the transverse edge at the end of each lane and along the exposed longitudinal edges between adjacent lanes, hand raked, and compacted to form

temporary conforms. Kraft paper, or other approved bond breaker, may be placed under the conform tapers to facilitate the removal of the taper when paving operations resume.

A drop-off of more than 0.15-foot will not be allowed at any time between adjacent lanes open to public traffic.

3.06 WORKING HOUR RESTRICTIONS

To ensure that the roadway will be opened in time so as not to impact peak traffic, all paving operations shall be shut-down by 3:00 pm each day, unless a later time is allowed, at the sole discretion of the Engineer, based upon his assessment of how long the completion of AC plugs and clean-up will take.

PART 4 – MEASUREMENT AND PAYMENT

Included in Section 100 of these Technical Specifications.

END OF SECTION 107

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SECTION 108

SLURRY SEAL

PART 1 – GENERAL

Work shall consist of furnishing and placing an application of Slurry Seal.

The work shall include providing aggregate and asphalt binder, spreading and compacting the mixture, to the lines, grades, and dimensions shown in the Contract Documents.

Slurry Seal shall conform to the provisions of Section 37-3, “Slurry Seals and Micro-Surfacings”, of the State Standard Specifications and to these Technical Provisions.

1.02 SUBMITTALS

The Contractor shall provide a Certificate of Compliance for Asphalt Binders, Emulsion, and Screenings and other materials used under this Section in conformance with the requirements of the Contract Documents.

The Contractor shall provide a Certificate of Compliance for Slurry Seal Asphalt Emulsion and Aggregate and other materials used under this Section in conformance with the requirements of the Contract Documents.

Contractor shall provide the Engineer with certified weight tickets furnished at the time of delivery to the inspector in the field.

Submittals shall conform to the provisions of Section 37-3.01A(3) “Submittals” , of the State Standard Specifications.

PART 2 – MATERIAL AND EQUIPMENT

2.01 AGGREGATE

Aggregate for slurry seals shall be Type II as specified in Section 37-3.01B(2), “Materials”, of the State Standard Specifications. Aggregates shall be black in color. The use of gray or light-colored aggregate will not be allowed.

2.02 ASPHALT BINDERS

Asphalt Binder shall conform to the provisions of Section 92, “Asphalt Binders”, of the State Standard Specifications and shall be paving asphalt Performance Grade PG 64-10 in conformance to Section 92-1.02(B) of the State Standard Specifications, unless otherwise directed by the Engineer.

Asphalt Binder shall be Polymer Modified Asphalt Emulsion Seal coat conforming to Section 37-3.02B (3) of the State Standard Specifications unless otherwise directed by the Engineer. The spread rate shall be between 0.55-0.65 gal/SY.

PART 3 – EXECUTION

3.01 SURFACE PREPARATION

Pavement markers and thermoplastic pavement stripes or markings shall be removed by grinding or other means acceptable to the Engineer prior to beginning work.

Complete street closures are not permitted. Contractor must make provisions to allow minimum of one 11-foot-wide lane of traffic open in each direction and provide one driveway access to each affected property at all times during working hours. Contractor must stage accordingly and may not initiate larger areas than can be constructed and reopened in a given day.

3.12 APPLICATION

The contractor is responsible for implementing measures as needed to allow for work to proceed during cold weather, should it occur.

Slurry seal shall be placed in accordance with Section 37-3.02C(4), “Placement”, of the State Standard Specifications.

Existing pavement surfaces shall be clean and dry prior to application of the slurry seal. The mixture shall fill all minor cracks, depressions or low areas and leave a uniform surface free from ruts, humps, depressions, or irregularities. Any ridges, indentations, or other objectionable marks left in the surface shall be eliminated by rolling or other means.

Only place slurry seal if both the pavement and the air temperature are at least 50 degrees F and rising. Do not place slurry seal if either the pavement or the air temperature is below 50 degrees F and falling. The expected high temperature must be at least 65 degrees F within 24 hours after placement. Do not place the slurry seal if rain is imminent or the air temperature is expected to be below 36 degrees F within 24 hours after placement.

The mixture shall be of the desired consistency upon leaving the mixer. A sufficient amount of mixture shall be carried in all parts of the spreader at all times so that complete coverage is obtained. No lumping, balling, or unmixed aggregate shall be permitted. No streaks such as caused by oversize aggregate shall be left in the finished pavement.

Longitudinal joints must correspond with lane lines. Longitudinal and transverse joints must shall comply with Section 37-3.01C(5) of the State Standard Specifications. All excess materials shall be removed from surfaces upon completion of each run.

Squeegees shall be used to spread the mixture in areas not accessible to the mixer/spreader. Care shall be taken to leave no unsightly appearance from handwork.

Slurry seal shall be spread uniformly at rate of ten (10) to fifteen (15) pounds of dry aggregate per square yard, in accordance with the recommendations of the laboratory preparing the mix design. The exact spread rate may be adjusted by the Engineer depending on field conditions. The completed spread shall be within ten (10) percent of the specified rate. The spreader box shall be pulled at a rate NOT GREATER THAN 270 FEET PER MINUTE. The mixture must be uniform and homogeneous after spreading, and there must not be separation of the emulsion and aggregate after setting. The finished surface must be smooth.

Spread slurry seal in full lane widths. Do not overlap slurry seal between adjacent lanes more than 3 inches.

At limits of work, start or finish, a straight line cut-off shall be obtained by laying down a strip of building paper or other approved material. Such paper and any excess mixture shall be removed and disposed of by the Contractor after application of the slurry seal.

Existing utility covers shall be protected and covered by building paper or other approved material. Such paper and any excess mixture shall be removed and disposed of by the Contractor after application of the slurry seal.

Edge limits of the work on both sides of the street shall be maintained in a neat, straight, and uniform line. Slurry seal application shall extend to the gutter lip. In the event that the work extends onto the gutter more than one (1) to two (2) inches or is not in a neat, straight, uniform line, it will be the Contractor's responsibility to remove all excess mixture from the gutters using an appropriate method. Any runs or drips that spill onto any concrete surface shall be removed the same day that the spill occurs. All work associated with the removal of mixture from the concrete surfaces shall be conducted at the Contractor's expense.

Following application of the slurry seal, the Contractor shall protect the work from any traffic that may cause damage to the finished surface or result in tracking of the material until such time as the material has sufficiently cured. Within 1 hour after placement, the slurry seal must be set enough to allow traffic. Slurry seal must not exhibit distress from traffic such as bleeding, raveling, separation, or other distress.

Once the slurry seal has cured and is open to traffic, any excessive raveling of the aggregate from the mixture shall be swept up by the Contractor and the surface maintained until such time as the raveling ceases. This requirement for sweeping shall apply to both roadway surfaces and adjacent sidewalks/pedestrian facilities.

A sand blotter shall not be used.

The completed surface shall be thoroughly compacted, smooth, and free from ruts, humps, depressions, or irregularities. Any ridges, indentations or other objectionable marks left in the surface by blading or other equipment shall be eliminated by rolling or other means. The use of any equipment that leaves ridges, indentations, or other objectionable marks in the surface shall be discontinued, and acceptable equipment shall be furnished by the Contractor.

3.03 ROLLING

Slurry seal on all streets shall be rolled by a self-propelled, 10-ton pneumatic roller with a tire pressure of 50 PSI, equipped with a water spray system. All tires shall be smooth surfaced and inflated to the same pressure.

The surfaced areas shall be subjected to a minimum of two (2) full coverage passes by the roller or until the material is compacted to a uniform surface.

Rolling shall not commence until the slurry seal has cured enough so that it will not pick up on the tires of the roller, but no more than twenty-four (24) hours after placement.

3.04 STREET SWEEPING

The Contractor shall provide all necessary equipment, skill, and manpower to sweep all completed slurry sealed streets to the satisfaction of the Engineer, and in accordance with these Technical Specifications. Sweeping shall not begin until a sufficient bond has developed between the emulsion and the aggregate. Sweeping shall not dislodge aggregate or patches of applied surface.

The Contractor shall use a commercial sweeper to sweep each street that is slurry. During the sweeping, the sweeper shall use only the rear broom. The front brooms shall not be used during this sweeping operation. Brooms shall be vertically adjustable so as to avoid excess pressure during sweeping.

For slurry seal streets, the initial sweeping shall be performed no sooner than three (3) calendar days after the slurry seal has been applied to the street. The Contractor shall conduct additional sweepings at seven (7) calendar days and again at fourteen (14) calendars days after the slurry seal has been applied. A final sweeping shall be performed no sooner than twenty-eight (28) days and no later than forty-two (42) days following the slurry seal application. The Contractor shall submit a schedule of the dates for sweeping. The sweeping schedule shall be approved in advance by the Engineer.

Sidewalks and driveways adjacent to slurry sealed streets shall also be swept and kept clean of aggregates or other materials resulting from the application operation.

3.05 TEMPORARY PAVEMENT DELINEATION

Temporary pavement delineation shall be furnished, placed, maintained and removed in accordance with the provisions in Section 12-3.01, “General”, of the State Standard Specifications and these Technical Provisions. Nothing in these Technical Provisions shall be construed as to reduce the minimum standards specified in the Manual of Traffic Controls published by the Department of Transportation.

All work necessary, including any required lines or marks, to establish the alignment of temporary pavement delineation shall be performed by the Contractor. Surfaces to receive temporary pavement delineation shall be dry and free of dirt or loose material. Temporary pavement delineation shall not be applied over existing pavement delineation or other temporary pavement delineation. Temporary pavement delineation shall be maintained until superseded or replaced with a new pattern of temporary pavement delineation or permanent pavement delineation.

Temporary pavement markers and removable traffic type tape which conflicts with a new traffic pattern or which is applied to the final layer of surfacing or existing pavement to remain in place shall be removed when no longer required for the direction of public traffic, as determined by the Engineer.

Whenever lane lines and centerlines are obliterated, the minimum lane line and centerline delineation to be provided shall be temporary reflective raised pavement markers placed at longitudinal intervals of not more than 24 feet. The temporary reflective raised pavement markers shall be the same color as the lane line or centerline markers replaced.

Temporary reflective raised pavement markers shall be placed in accordance with the manufacturer’s instructions and shall be cemented to the surfacing with the adhesive recommended by the manufacturer, except epoxy adhesive shall not be used to place pavement markers in areas where removal of the markers will be required.

3.06 MIXING AND SPREADING

Mixing and Spreading shall conform to provisions of section 37-3.01C(3) “Mixing and Spreading Equipment” , of the State Standard Specifications.

PART 4 – MEASUREMENT AND PAYMENT

Included in Section 100 of these Technical Specifications.

END OF SECTION 108

SECTION 109

CRACK SEALING

PART 1 – GENERAL

Work covered by this section includes the cleaning out and sealing of cracks within all areas of the project scope. This includes existing asphalt concrete pavement areas not subject to grinding, removal or repair as well as within pavement sections after the cold planning and digout operations have been completed. Cracks ¼ inch to 1 inch in width shall be sealed with asphalt rubber crack seal material. Cracks or "pop-outs" of existing asphalt that are greater than 1 inch in width shall be sealed with Type A, 3/8 inch maximum asphalt concrete cement.

1.02 SUBMITTALS

Contractor shall submit certificates from suppliers stating compliance of materials with the requirements of this section.

PART 2 – MATERIAL AND EQUIPMENT

2.01 HOT APPLIED SEALANT (For cracks less than 1 inch)

Crack seal material shall consist of a single component, hot-applied, elastically modified asphalt composition specifically produced for effective pavement maintenance joint sealing. The asphalt to be used shall have a maximum penetration of 150 when tested in accordance with procedure outlined by the American Association of State Highway Officials.

The granulated crumb rubber (100 percent vulcanized) shall meet the following requirements:

Passing Sieve	Percent
No. 8	100
No. 10	98-100
No. 40	0-100

The sieves shall comply with the requirements of AASHTO 92.

The specific gravity of the granulated crumb rubber shall be 1.15 + 0.02 and shall be free of fabric, wire or other contaminating materials, except that up to four percent of calcium carbonate may be included to prevent particles from sticking together.

The proportions of the two materials by weight shall be 75 percent +2 percent asphalt and 25 percent +2 percent rubber.

The materials shall be packed in approximately 60 pound boxes with a polyethylene liner. The boxes shall be placed on pallets and covered with a weather resistant covering.

2.02 ASPHALT CONCRETE MIX (For cracks larger than 1 inch and not in dig-out area)

The asphalt to be used shall have a maximum penetration of 150 when tested in accordance with procedure outlined by the American Association of State Highway Officials.

Mineral aggregate material for asphalt concrete for sealing cracks larger than 1 inch shall be Type A, 3/8 inch maximum, medium graded aggregate, conforming to Section 39, State Standard Specifications.

PART 3 – EXECUTION

3.01 GENERAL

Prior to crack seal operations the Contractor shall clean the cracks of all organic material within the limits to be crack sealed. Contractor shall apply crack seal material during the same shift when the cracks were cleaned.

Cracks to be filled shall be completely dry at the time of filling, and in no case shall crack sealing be performed within 24 hours of any precipitation. Sealant shall be applied when the pavement surface temperature exceeds 50°F. Application at lower temperatures may result in reduced adhesion due to possible presence of excess moisture.

Cracks ¼ inch to 1 inch wide shall be blown clean of all organic materials with a high-pressure air nozzle and/or a mechanical cleaning process to a depth of ½ inch minimum.

The asphalt-rubber shall be heated to a minimum temperature of 300° F but not greater than 350°

The material shall be held in the mixing tank at application temperature until very little separation of the rubber and asphalt occurs when a bead of sealant material is placed on the pavement. Sealant material may be added to the mix as long as the minimum temperature of 300° F is maintained.

Asphalt-vulcanized rubber crack sealant material shall be applied to all cracks ¼ inch or greater so as to be flush with the adjacent pavement surface. Cracks shall be sealed from the bottom up. Excess sealant shall be leveled to less than a 1/8 inch thickness with a squeegee or sealing shoe to produce a band which is 2 to 4 inches wide, centered over the crack.

Contractor shall not overfill cracks, as excess filler will cause bumps in the overlay and may migrate through the paving surface course during compaction.

Traffic shall not be allowed on the material until it has cured or until it has been sanded to prevent tracking.

All crack sealing shall be completed at least one-working day prior to resurfacing. Reinforcing fabric shall not be placed for at least 24 hours after crack sealing.

3.2 CRACKS LARGER THAN 1 inch AND NOT IN DIG-OUT AREA

Cracks larger than 1 inch and not in a dig-out area shall be blown clean of all organic materials with a high pressure air nozzle and/or a mechanical cleaning process to a depth of ½ inch minimum.

Cracks shall be filled with Type A, 3/8 inch maximum, medium graded aggregate asphalt concrete mix.

PART 4 – MEASUREMENT AND PAYMENT

Included in Section 100 of these Technical Specifications.

END OF SECTION 109

SECTION 110

FULL DEPTH RECLAMATION (FDR)

PART 1 – GENERAL

1.01 WORK INCLUDED

For constructing a base using full-depth reclamation (FDR) with cement. FDR consists of:

1. Pulverizing existing asphalt concrete pavement and underlying materials to a uniform mix
2. Earthwork export of the pulverized material to a depth specified on the plans
3. Mixing the remaining pulverized material with water and cement
4. Grading and compacting the mixture
5. Microcracking
6. Applying asphaltic emulsion
7. Preparing the surface for HMA paving

1.02 DEFINITIONS

OMC: Optimum moisture content determined under California Test 216

lot: 1,000 sq yd of FDR

1.03 CONTRACTOR QUALIFICATIONS

The Contractor performing FDR stabilization shall document a minimum of five (5) years of experience performing similar full depth reclamation work. . The Contractor shall submit a list of equipment to be utilized in performance of the FDR work. The Contractor shall submit a detailed description of work procedures for approval by the Engineer prior to beginning FDR work.

The Contractor performing FDR shall have a representative on site with a minimum of five (5) years' experience with FDR. Their function shall include coordinating with other Contractors and site representatives. All personnel shall be properly trained in the FDR treatment processes, including quality control and safety procedures.

1.04 PROTECTION OF EXISTING UTILITIES

The Contractor shall comply with Section 5-1.36D to verify the depths of existing utilities and services and confirm there is sufficient cover over the utilities to provide clearance for the FDR mixing process without damage to the existing utility facilities. This paragraph shall not relieve the Contractor of conforming to all utility protection requirements contained elsewhere in these contract specifications.

The Contractor shall be responsible for the protection of the existing pipelines, manholes, catch basins, valve boxes, and other utility structures that are to remain within the FDR work area. Any such utility facilities that are damaged from FDR work performed by the contractor shall be either repaired or replaced to the satisfaction of the Engineer at no cost to the City, in accordance with Section 5-1.36.

FDR treatment shall continue up to two (2) feet on either side from centerline of shallow pipelines identified in the field.

The City is not responsible for the data provided and the Contractor shall confirm the conditions of the utility depths on their own.

1.05 SUBMITTALS

At least 20 days before starting FDR work, submit:
1. Mix design
2. QC plan

1.06 SCHEDULING

Schedule a preoperation conference at a mutually agreed time at the job site to meet with the Engineer. Discuss the project specifications and methods of performing each item of the work. Items discussed must include the processes for:
1. Determining the mix design
2. Production
3. Compacting
4. Grading
5. Finishing
6. Implementing the approved QC plan
7. Implementing the contingency plan
8. QC sampling and testing
9. Acceptance criteria

Pre-operation conference attendees must sign an attendance sheet provided by the Engineer. The pre-operation conference must be attended by your:
1. Project superintendent
2. Project manager
3. QC manager
4. Workers and your subcontractor's workers, including:
   4.1. Foremen
   4.2. Ground supervisors
   4.3. Representative from testing lab

PART 2 – MATERIAL AND EQUIPMENT

2.01 EQUIPMENT

Do not interrupt traffic while servicing FDR equipment.

The cement spreader shall be equipped with such instrumentation and control equipment to control spread reates over variable travel speeds. The operator shall demonstrate that the instrumentation and control equipment is calibrated and cable of controlling the spread rates within specifications.

The FDR machine must have independent and interlocked systems for water and must include the following:
1. Digital electronic controller system
2. Pumping system
3. Spray bar system

The mixing equipment shall be capable of mixing the full-specified depth of cement treatment, leaving a relatively smooth plane at the bottom of the FDR section. Mixing equipment shall be equipped with a visible depth indicator showing the mixing depth, and odometer or footometer to indicate travel speed, and a controllable water additive system for regulating water added to the mixture.

Storage equipment for water must not leak and must be attached to the FDR machine with a tow bar and hose.

Grading and compacting equipment must be self-propelled and reversible. The frequency and amplitude of vibrating rollers must be adjustable and exceed a force of 15 tons in vibratory mode.

Grading equipment must be a motor grader with automatic grade controls for profile elevation and cross slope.

When compacting cement treated sections greater than eight (8) inches, a “sheepsfoot” type compactor capable of compacting the entire section to the specified depth shall be used.

2.02 MATERIALS

Cement must be Type II or Type V portland cement specified in ASTM C 150/150M.

Lime shall comply with Section 24-2.02.

Notify the Engineer if a water source other than potable water is used and perform testing for chlorides and sulfates. Water shall be free from oils, acids, organic material or other substances deleterious to the cement treatment of materials. The water shall not contain more than 1,000 parts per million of chlorides nor more than 1,000 parts per million of sulfates.

The pulverized mixture of asphalt concrete and underlying material, supplementary aggregate, and cement must comply with the grading requirements for the sieve sizes shown in the following table:

FDR-C Gradation

Sieve Size	Percentage Passing
3"	100
2"	95-100
1.5"	85-100

The moisture content at the time of mixing must comply with the mix design within 2 percentage points.

Asphaltic emulsion must be Grade SS1h or CSS1h.

For dilution, the weight ratio of water added to asphaltic emulsion must not exceed 1 to 1.

30-4.02H Core Backfill Material

Material to fill cored holes for thickness measurements must be packaged rapid-hardening cementitious material under ASTM C 928, Type R2 or R3.

For bidding purposes, Contractor shall use the cement percent application rates as shown on the plans. Contractor shall also submit an add/deduct price per ton for cement that may exceed or reduce the application rates shown on the plans. The actual target cement application rates shall for construction shall be determined by laboratory testing completed by the Contractor.

PART 3 – EXECUTION

3.01 GENERAL EXECUTION

Do not start FDR activities, including test strips, until the listed personnel have attended a pre-operation conference.

Relative compaction must be determined under California Test 231 and the following:

1. Test in 0.50-foot depth intervals from the bottom of the FDR layer regardless of the layer thickness
2. Correction for oversize material does not apply
3. A sample must contain no more than 5 percent retained on the 2-inch sieve and 15 percent retained on the 1-1/2 inch sieve
4. Use the laboratory wet test maximum density closest in proximity to the lot to determine relative compaction. If the relative compaction for a lot is less than 97 percent, perform California Test 216 and California Test 226 for each noncompliant lot and recalculate the relative compaction
   - Divide the area to receive FDR into lots of FDR produced except the test strip is the 1st lot and must be at least 2,000 sq yd. A quantity of FDR placed at the end of a work shift greater than 500 sq yd is considered 1 lot. If a quantity of FDR placed at the end of a work shift is less than 500 sq yd, you may either count this quantity as 1 lot or include the test results for quality control in the previous lot.
   - For any lot including the test strip, stop FDR activities and immediately inform the Engineer whenever:

1. Any test result shown in the QC Requirements table or the FDR Acceptance Criteria Testing table does not comply with the specifications
2. Visual inspection shows evidence of:
   2.1. Poor dispersion or dry spots
   2.2. Segregation, raveling, and loose material
   2.3. Variance of more than 0.05 foot measured from the lower edge of a 12-foot straightedge
   2.4. Nonuniform surface texture throughout the work limits
   2.5. Repaired areas

If FDR activities are stopped, before resuming activities:

1. Notify the Engineer of the adjustments you will make
2. Remedy or replace the noncompliant lot until it complies with specifications
3. Construct a new test strip of FDR-C with proposed adjustments demonstrating ability to comply with the specifications
4. Obtain authorization

Do not start FDR activities if the ambient air temperature is below 40 degrees F or the road surface is below 40 degrees F. If the ambient air temperature falls below 40 degrees F during FDR activities, you may only compact and finish FDR.

Before starting daily FDR activities, sweep the FDR area constructed the previous day to remove loose material.

3.02 QUALITY CONTROL PLAN

The QC plan must describe the organization, responsible parties, and procedures you will use for:

1. QC including sampling, testing, and reporting
2. Determining action limits when corrective actions are needed
3. Implementing corrective actions
4. Ensuring FDR pulverizing, earthwork, mixing, compacting, grading, microcracking, and finishing activities are coordinated

The QC plan must include copies of the forms that will be used to provide the required inspection records and sampling and testing results. The form for recording and reporting the QC measurements must show the cement and water proportions.

The QC plan must include a contingency plan that describes the corrective actions you will take in the event of equipment break down. The corrective actions must include repairing and reopening the roadway to traffic using minor HMA under section 39-1.15.

3.03 MIX DESIGN

Submit each FDR mix design on a form you create specifically for FDR. Each mix design submittal must be signed and sealed by an engineer who is registered as a civil engineer in the State.

You may submit multiple mix designs to optimize the cement content and adjust for varying underlying materials.

Each mix design submittal must include:

1. Area represented by the mix design by beginning and ending stations
2. Gradation of the mixture before addition of cement
3. Cement content in percent by weight of the dry mixture and in ____ lb/sq yd surface application rate
4. Supplementary aggregate in percent by weight of the dry mixture if supplementary aggregate is specified
5. Moisture content of the material at the time of mixing, relative to OMC
6. Test results and any worksheets, photographs, and graphs

3.04 TEST STRIP

Submit a summary of the determinations made from the test strip.

On the 1st day of FDR activities and using the same equipment and materials that will be used during production, construct a test strip of at least 1,500 feet in a single lane width to determine the:

1. Equipment, materials, and processes can produce FDR in compliance with the specifications
2. Effect of varying the FDR machine's forward speed and drum rotation rate on the consistency of the pulverized material
3. Optimal proportions of supplementary aggregate, cement, and water. Changes to the mix design must be authorized.
4. Rolling method and sequence can comply with the compaction and finishing specifications
5. Application rate of asphaltic emulsion for opening to traffic.

The Engineer tests each test strip under section 30-4.01D(5). Do not proceed with FDR activities until the Engineer informs you the test strip is acceptable. If QC or Engineer's acceptance test results are not available, you may proceed at your own risk.

3.05 QUALITY CONTROL REPORTING

For each lot, submit a report daily that includes the following items based on the frequencies specified in section 30-4.01D(4):

1. General Information:
    1.1. Lot number
    1.2. Location description
    1.3. Beginning and ending stations
    1.4. Lane number and offset from centerline
    1.5. Weather:
        1.5.1. Ambient air temperature before starting daily FDR activities including time of temperature reading
        1.5.2. Road surface temperature before starting daily FDR activities including time of temperature reading

2. Calculated cement application rate in lb/sq yd and percent of dry weight of FDR
3. Calculated supplementary aggregate application rate in lb/sq yd and percent of dry weight of FDR if supplementary aggregate is specified
4. For FDR processing:
   4.1. Depth of cut
   4.2. Average forward speed
5. FDR quality control test results for:
   5.1. Gradation
   5.2. Moisture content
   5.3. Unconfined compressive strength
   5.4. In-place wet density
   5.5. Relative compaction
6. For asphalt emulsion used on finished FDR surface:
   6.1. Emulsion type
   6.2. Emulsion application rate in gal/sq yd
   6.3. Emulsion dilution as the weight ratio of added water to asphaltic emulsion
7. Note on the daily report the postmile or station limits of any unsuitable materials locations and when the Engineer was notified

Update each day's submitted report within 24 hours of obtaining test results. Consolidate all lots completed in a day in one report with each lot reported separately.

3.06 MIX DESIGN SAMPLING AND TESTING

Specify the cement content and dry unit weight indicated by preliminary site investigations or knowledge from previous contracts.

The cement content shall match the percentages shown on the plans, except an increase or decrease in the cement content may be ordered based on your mix design. During progress of the work, if you encounter an isolated area that requires more cement than described in the mix design for that area, notify the Engineer before applying the cement.

Insert the minimum 7-day compressive strength, at least 300 psi, that is 50 psi more than the compressive strength used to determine gravel factor in design. Do not specify a minimum greater than 500 psi.

Perform a mix design for each materials sampling location. The mix design must produce FDR with an unconfined compressive strength from 300 psi to 600 psi, determined at 7 days under ASTM D 1633, Method A, except:

1. Test specimens must be compacted under ASTM D 1557, Method A or B.
2. Test specimens must be cured by sealing each specimen with 2 layers of plastic at least 4-mil thick. The plastic must be tight around the specimen. Seal all seams with duct tape to prevent moisture loss. Sealed specimens must be placed in an oven for 7 days at 100 ± 5 degrees F. At the end of the cure period, specimens must be removed from the oven and air-cooled. Duct tape and plastic wrap must be removed before capping. Specimens must not be soaked before testing.

The mix design must include 7-day unconfined compressive strength tests on specimens with 3 cement contents using the proposed cement and optimum mixing moisture content. The cement contents must be -1 percent of specified content, specified content, and +1 percent of specified content by dry weight of FDR. Manufacture 3 specimens for each cement content and average the results for each. Plot the average 7-day compressive strengths on the ordinate versus the cement contents in percent on the abscissa on a graph. Indicate the cement contents from the line corresponding to the minimum and maximum 7-day compressive strengths from the specified range.

Based on the mix design test results, you may propose a cement content different from the specified cement content. If you propose a different cement content, your mix design submittal must include data to support (1) the specified cementcontent will not produce FDR that complies with the specifications or (2) there is variability in the FDR materials resulting in risk of not complying with the specifications. The revised cement content must be authorized. Compensation or deductions for an ordered increase or decrease is specified in section 30-4.04.

Notify the Engineer at least 2 business days before sampling. Testing must be performed by an authorized laboratory. Testing personnel for QC must be qualified under the Department's Independent Assurance Program.

Fill in the blank with the anticipated number of sampling locations recommended by the District Materials Engineer in the Materials Information Handout. If test pits are required instead of or in addition to cores, edit.

Obtain and test material from at least two sampling locations, per street, from the existing pavement structure by coring. You may perform additional sampling and testing to optimize the cement content and adjust for varying underlying materials. Determine the exact locations of the sampling locations between wheel paths. Do not sample in the shoulders. Sampling locations must provide sufficient representative material for the mix design.

Use materials from the specified FDR mixing depth. If any portion of existing asphalt concrete pavement is to be removed before pulverizing, remove that portion of asphalt concrete pavement from the samples used in the mix design. If additional samples of subgrade material are needed, sampling locations can be excavated outside the edge of pavement to variable dimensions. Characterize and record sampling location features such as layer thicknesses and types, distresses, interlayers, thin or thick areas, digouts, and adhesion to the base. Use the sampled material to determine the mix design represented by the sampling location, according to the proportions of the pavement structure shown.

Before opening the mix design sampling locations to traffic, backfill sampling locations by replacing and compacting with an authorized material or minor HMA that complies with section 39-1.15. Backfill and compact to the existing grade and thickness of asphalt concrete pavement, in the Engineer's presence.

3.07 TEST STRIP SAMPLING AND TESTING

Designate a ground supervisor whose sole purpose is to monitor the FDR activities, advise project personnel, and interface with the quality control testing personnel. The ground supervisor must not have any sampling or testing duties.

Take samples under California Test 125.

Perform sampling and testing for each test strip and at the specified frequency for the quality characteristics shown in the following table:

Quality Control Requirements

Quality characteristic	Test method	Minimum sampling and testing frequency	Requirement	Sampling location	Maximum reporting time allowance
Water sulfates [a] (ppm, max)	California Test 417	1 per source	1,300	Source	Before work starts
Water chlorides [a] (ppm, max)	California Test 422	1 per source	650	Source	
Gradation (%, passing)[b] Sieve Size 3 inch 3 inch 1-1/2 inch	California Test 202	Test strip and 1 per lot	 100 95–100 85–100	Loose mix after pulverizing and mixing	24 hours
Moisture content (%)	California Test 226	Test strip and 2 per day [c]	Mix design ± 2 percentage points	Loose mix after pulverizing and mixing [d]	24 hours
Unconfined compressive strength (psi)	ASTM D 1633[e]	Test strip and 1 per 2 lots	Specified in section 30-4.01B(2)	Loose mix after pulverizing and mixing [d]	24 hours after testing specimens
Laboratory maximum wet density (lf/cu ft)	California Test 216	Test strip and 2 per day	Use for relative compaction calculation	Same location as a California Test 231 test	24 hours
Relative compaction (%, min) (wet density) [f]	California Test 231	Test strip and 1 per lot	97	Compacted mix	24 hours

[a] Only required for non-potable water sources.
[b] Remove solids larger than 3 inches.
[c] If test fails, minimum test frequency is 1 per lot
[d] Sample immediately after mixing is complete
[e] Method A, except:
1. Test specimens must be compacted under ASTM D 1557, Method A or B.
2. Test specimens must be cured by sealing each specimen with 2 layers of plastic at least 4-mil thick. The plastic must be tight around the specimen. Seal all seams with duct tape to prevent moisture loss. Sealed specimens must be placed in an oven for 7 days at 100 ± 5 degrees F. At the end of the cure period, specimens must be removed from the oven and air-cooled. Duct tape and plastic wrap must be removed before capping. Specimens must not be soaked before testing.

[f] Verify the moisture content reading made under California Test 231 with California Test 226.

Measure and record the actual cut depth at both ends of the pulverizing drum at least once every 300 feet along the cut length. Take measurements in the Engineer's presence.

3.08 ASPHALTIC EMULSION

With each dilution of asphaltic emulsion used for finishing under section 30-4.03H, submit:

1. Weight ratio of water to bituminous material in the original asphaltic emulsion
2. Weight of asphaltic emulsion before diluting
3. Weight of added water
4. Final dilution weight ratio of water to asphaltic emulsion

3.09 ACCEPTANCE CRITERIA

FDR acceptance is based on:

1. Visual inspection for the following:
   - 1.1. Segregation, raveling, and loose material
   - 1.2. Variance of more than 0.05 foot measured from the lower edge of a 12-foot straightedge
   - 1.3. Uniform surface texture throughout the work limits

1.4. Repaired areas

2. Compliance with the quality characteristics shown in the following table:

FDR Acceptance Criteria Testing

Quality Characteristic	Test Method	Requirement
Cement application rate (lb/sq yd)	Calibrated tray or equal	Mix design rate ± 5%
Relative compaction (%, min, wet density)	California Test 231	97
Thickness (ft) [a]	Core measurements	±0.05 of the thickness shown

[a] Take 4- or 6-inch diameter cores from random locations the Engineer selects. The Engineer may require 3 locations per lot; coring more than 3 locations per lot is change order work. At time of coring, submit cores to the Engineer for measurement.

3.10 SURFACE PREPARATION

Before FDR activities start, prepare the existing roadway surface by:

1. Clearing foreign matter including vegetation
2. Removing standing water
3. Referencing the profile and cross slope
4. Marking the proposed longitudinal cut lines on the existing pavement as follows:
   - 4.1. Cut lines must coincide with points where the existing cross slope changes, approximately at the centerline and edge of traveled way
   - 4.2. Cut lines must indicate the sequence of the cuts

If excess material is to be stored adjacent to the shoulder, clear and dispose of the weeds, grass, and debris from the area.

3.11 PULVERIZING

Do not pulverize more material than can be mixed with cement and compacted in one day. Pulverize to depths shown on the plans.

Do not leave a wedge where the pulverizing drum cuts into the existing material. The 1st cut width must use the full width of the pulverizing drum. Subsequent cuts must overlap at least 4 inches. Do not leave a gap of unpulverized material between cuts. If an overlap is more than 4 inches, immediately adjust. If an overlap is less than 4 inches, immediately back up and pulverize the deviation along the correct cut line.

Mark the existing pavement where the center of the pulverizing drum stops. Start the following cut on this alignment at least 2 feet behind the mark.
If you encounter unstable subgrade or rocks greater than 4 inches in the roadway section, notify the Engineer. The Engineer determines the extent of the problem and the corrective measures to be taken.

3.12 EARTHWORK EXPORT

Regrade and haul away excess pulverized material to conform to the final road grades and cross slopes of 2%, minus the depth of the HMA layer thicknesses shown on the plans, prior to application of cement.

If the established grade will cause noncompliance with the thickness requirements, notify the Engineer.

3.13 SPREADING MATERIALS

Use if supplementary aggregate is used. Edit the spread rate used to develop the quantity of supplementary aggregate.

Spread cement uniformly over the full roadway surface width. Do not spread cement more than 30 minutes before mixing. Do not apply dry cement in windy conditions that will result in dust outside the FDR area. The spread rate must be the mix design rate or the ordered rate in lb/sq yd ± 5 percent.

Do not spread cement before pulverizing.

3.14 MIXING

The overlap requirements in section 30-4.03D apply to mixing. With each cut, adjust the amount of water proportionally to the actual cut width. If an overlap is less than 4 inches, immediately back up and pulverize the deviation along the correct line without adding water or cement.

Water must be injected through the pulverizing machine. The injection rate of mixing water must be sufficient to produce the FDR material mixing moisture content described in the mix design.

Mark where the center of the pulverizing drum stops. Start the following cut on this alignment at least 2 feet behind the mark.

Before compacting, remove solids larger than 3 inches in any dimension by hand.

3.15 COMPACTING AND GRADING

Immediately after pulverizing and mixing, compact FDR to the minimum relative compaction. Do not allow more than 2 hours between final mixing of the pulverized material with cement and completion of compaction with vibratory steel drum rollers.

During grading and final compaction with vibratory steel drum rollers, add water to maintain the mixing moisture content as described in the mix design.
If profile and cross slope are not shown on the plans, the typical cross sections must specify "match existing" grades.
If the established grade will cause noncompliance with the thickness requirements, notify the Engineer.

3.16 FINISHING

The finished FDR surface must not vary more than 0.05 foot from the lower edge of a 12-foot straight edge laid in directions parallel and perpendicular to the centerline.

Immediately after compaction, apply water and roll with pneumatic-tired rollers or steel drum roller with no vibration. The finished surface must be free of ruts, bumps, indentations, segregation, raveling, and any loose material.

Keep the compacted surface damp by lightly watering until asphaltic emulsion is applied.

During the period from 48 to 72 hours after compaction, microcrack the surface by applying 3 single passes with a 12-ton vibratory steel drum roller at maximum amplitude travelling from 2 to 3 mph, regardless of whether asphaltic emulsion has been applied.

Apply a coat of diluted asphaltic emulsion to the finished surface when it is damp but free of standing water. The application rate of asphaltic emulsion must be from 0.13 to 0.25 gal/sq yd. Do not water after applying asphaltic emulsion. Do not open to traffic without authorization.

While open to traffic and before placing HMA, maintain the FDR surface free of ruts, bumps, indentations, raveling, and segregation. Repair damaged FDR material with minor HMA.

Take cores to determine the finished FDR thickness before placing HMA.

If a core indicates FDR thickness is less than the specified thickness by more than 0.05 foot, core in the vicinity of the noncompliant core to determine the extent of the deficient thickness. Remove the FDR material deficient in thickness by cold planning to a depth of 0.2 foot below the finished FDR grade. Replace the planed FDR with the HMA specified for the project and compact under section 39-2.03.

Immediately before placing HMA, apply asphaltic emulsion at a rate from 0.03 to 0.05 percent residual binder content.

Do not place HMA until authorized.

PART 4 – MEASUREMENT AND PAYMENT

Included in Section 100 of these Technical Specifications.

END OF SECTION 110

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SECTION 111

STRIPING AND SIGNAGE

PART 1 – GENERAL

1.01 WORK INCLUDED

The work shall consist of placing pavement striping, markings, and raised pavement markers, placing temporary markers and painting curbs at the locations shown on the project plans and in accordance with the Contract Documents to the dimensions and details shown in the Caltrans Standard Plans, latest edition. Nothing in this Section shall relieve the Contractor from his responsibilities as provided in Section 7-1.04, “Public Safety”, of the State Standard Specifications.

Work shall also consist of grinding existing thermoplastic striping and legends where shown on plan, at conform locations.

Removal, relocation, and installation of all traffic (vehicular and pedestrian/bicycle), Stormwater Management Educational, and Project Funding signs and RRFB as shown on the plans.

Supplying all labor, materials, equipment, and apparatus not specifically mentioned herewith or noted on the plans, but which are incidental and necessary to complete the work specified.

1.02 SUBMITTALS

Contractor shall submit certificates from the suppliers stating compliance of the materials with the requirements of this section.

PART 2 – MATERIAL AND EQUIPMENT

2.01 TEMPORARY PAVEMENT MARKERS (FLOPPIES)

Short term, temporary pavement markers shall be day/night retro reflective raised pavement markers conforming to the requirements of Section 84 of the State Standard Specifications and the CA MUTCD.

2.02 THERMOPLASTIC STRIPES AND MARKING

The thermoplastic material shall conform to State Specification PTH-02SPRAY, PTH-02HYDRO or PTH-02ALKYD with a minimum skid friction value of BPN = 35.

Glass beads to be applied to the surface of the molten thermoplastic material shall conform to the requirements of State Specification 8010-22L-22 (Type II), or AASHTO Designation: M 247 (Type 1). Copies of State Specification 8010-22L-22 are available at the State of California Transportation Laboratory, Sacramento, California.

Stencils for pavement markings shall be US customary units (English), in accordance with the State Standard Plans.

2.03 PAINT STRIPES AND MARKINGS

Paint material to be used for striping and pavement markings shall conform to Section 84-2 “Traffic Stripes and Pavement Markings” of the State Standard Specifications.

2.04 ADHESIVES

Adhesive for pavement markers shall be either rapid set epoxy or hot melt bituminous adhesive conforming to the requirements of Section 85 of the State Standard Specifications.

2.05 RAISED PAVEMENT MARKERS

Pavement markers shall be of the type called for in the Contract Documents and shall conform to the requirements of Section 84-2 “Traffic Stripes and Pavement Markings” of the State Standard Specifications and the CA MUTCD. All pavement markers shall be plastic. Ceramic markers will not be allowed.

2.06 REFLECTORIZED MARKERS

Retro reflective markers shall be of the size and type designated on the plans and shall conform to the requirements of Section 8 of the State Standard Specifications. Mounting hardware shall conform to the requirements of Section 81-3.02C “Retroreflective Pavement Markers” of the State Standard Specifications.

2.07 CURB PAINTING

Curb paint shall be of a latex base consisting of color in accordance with County Standards.

2.08 SURFACE MOUNTED DELINEATORS

Delineators shall surface mount delineators with multi-hit, omni-directional, and self-righting. The base of the delineator shall not exceed 7-inches. The delineator shall be mounted via anchor bolts or via epoxy.

2.09 TRAFFIC SIGN PANELS

Materials shall be in conformance with Section 82, “Signs and Markers” of the State Standard Specifications and the CA MUTCD, except that all materials will be supplied by the Contractor.

All signs shall be fabricated from high tensile alloy aluminum with reflective smooth finish. Sign panels shall be a minimum of 0.080-inch-thick, cut to size and shape with a tolerance of 1/32 inch. Panels shall be flat and free of buckles, warps, dents, burrs and any other defects resulting from fabrication.

All signs are to be of Diamond grade reflectivity.

Sizes for signs in the street, or signs that serve both bicyclists and vehicles, shall be as required for “Conventional Roads” as defined in Part 2, “Signs,” of the CA-MUTCD.

2.10 TRAFFIC SIGN FASTENERS AND POSTS

Posts for signs shall be 1-3/4” Square galvanized 14 Gauge Steel Signposts with perforations.

Fasteners for posts shall be straight bolts for conventional sign installation and square post system corner-bolts for back to back installation.

2.11 SIGN FOUNDATION

Post foundations shall use concrete as defined in Section 108 “Concrete Improvements” of these Technical Specifications, where required as shown on plan.

2.12 STORMWATER MANAGEMENT EDUCATIONAL SIGN

The stormwater management educational sign panel shall be a 18”x24” minimum frameless

pedestal mount style interpretive sign. The sign panel shall be manufactured of high pressure laminate.

The sign post and mounting hardware shall consist of high strength aluminum that is powder coated NPS forest green, and fabricated from structural shapes, formed sections, tubing, and sheeting complying with ASTM B209. Aluminum must be free of defects and be uniform in appearance. Closed sections must be made of 1-piece tubing.

Sign posts shall be set in minor concrete conforming to Section 90-2, “Minor Concrete”, of the State Standard Specifications.

2.13 RECTANGULAR RAPID FLASHING BEACONS (RRFB)

RRFB Shall be a complete wireless system installed as shown on the plan set, and in accordance with the manufacturer’s recommendations.

System shall consist of the following:

1. (2) 13’ tall, 4.5” outer diameter aluminum pole with foundation system per
2. (4) w11-2 signs (fyg)
3. (2) w16-7p (left) (fyg)
4. (2) w16-7p (right) (fyg)
5. (4) led light bars
6. solar power with wireless transmission
7. all software and hardware required for installation
8. (2) push buttons

Contractor shall install foundation, poles, pedestals, light bars, solar wireless apparatuses, push buttons, signs, brackets, and software at eight (8) accessible ramp locations as shown on the plans and in accordance with the manufacturer’s recommendations.

2.14 PROJECT FUNDING SIGN

To inform the public of the work, the Contractor shall provide a custom-made sign (modified Caltrans Standard Plan T-7), at the project limits (total of 2 signs). The signs shall be professionally prepared with blue lettering and border on a white background and installed on 4”x4” wood posts. Post embedment must be 2.5 feet and backfilled with native material. Location and exact wording of each sign shall be coordinated with the City prior to ordering signs.

Keep project funding sign clean and in good repair at all times. Replacement of damaged project funding signs shall be at the Contractor’s expense.

Furnish, deliver, and install sign panels for project funding signs fabricated in accordance with the project drawings.

Place construction project funding signs, in conjunction with construction area signs, at least 2 weeks prior to the start of work.

PART 3 – EXECUTION

Permanent striping and markings shall be completed within fourteen (14) calendar days of each road’s paving or paving treatments.

Completed traffic stripes and pavement markings shall have clean and well-defined edges without running or deformation shall be uniform, straight on a tangent alignment, and on a true arc on a curved alignment. The width of completed traffic stripes and pavement markings shall not deviate in dimensions as specified in Section 81-3.02C of the State Standard Specifications.

3.01 REMOVAL OF EXISTING MARKING AND MARKER

Before obliterating any pavement delineation or markings that are to be replaced in the same direction, the Contractor shall document and reference the existing pavement delineation and markings with sufficient control points to reestablish their alignment.

Existing pavement markings, markers, buttons, and striping shall be removed and disposed of as required by the Contract Documents and as directed by the Engineer. Removal shall be performed in such a manner so as to leave the existing pavement undamaged. Should the removal process leave a divot of more than ¼-inch-deep, each divot shall be repaired with an approved bituminous adhesive.

Waste from removal of yellow painted traffic stripe may contain lead chromate. Residue produced when yellow paint is removed may contain heavy metals in concentrations that exceed thresholds established by the California Health and Safety Code and may produce toxic fumes when heated. As such, when grinding or other methods approved by the Engineer are used to remove yellow painted traffic stripes, the removed residue, including dust, shall be collected and contained immediately. The Contractor shall submit a written work plan for the removal, storage, and disposal of yellow painted traffic stripe to the Engineer for approval not less than 15 days prior to the start of the removal operations. Removal operations shall not be started until the Engineer has approved the work plan.

3.02 TEMPORARY PAVEMENT MARKERS (FLOPPIES)

If permanent pavement markers cannot be installed immediately after resurfacing, short-term temporary retro reflective pavement markers shall be installed prior to opening the street to traffic. Temporary markers shall be monitored, maintained and replaced by the contractor as necessary until such time that permanent striping can be applied.

Temporary pavement markers shall be placed not more than 12-feet apart on curves nor more than 24-feet apart on straight segments, in the quantity and appropriate colors to delineate centerlines (two yellow markers spaced 3-inches apart) and travel lanes (single white marker). Edge lines, median lines and bike lanes need not be marked.

3.03 LAYOUT AND CAT-TRACKING

No permanent striping or application of pavement markers shall occur until after the Contractor has field marked and established a satisfactory alignment and layout for the proposed striping (cat-tracking) and this alignment has been approved by the Engineer.

Cat tracking shall consist of stretching a rope on a straight line between control points on tangent alignment and on a true arc through control points on curved alignment and placing spots of paint along the rope.

The City shall have the right to make changes in the location and alignment of line stripes. Striping and traffic markings shall not be applied until approval is granted by the Engineer. The Contractor shall allow a minimum of three working days for review of the layout by the City.

3.04 THERMOPLASTIC STRIPES AND MARKING

Thermoplastic stripes and markings shall be hot applied in conformance with the manufacturer's recommended instructions and the applicable requirements of Section 84-2.03C(2) of the State Standard Specifications.

Thermoplastic material shall be applied only to dry pavement surfaces and only when the pavement surface temperature is above fifty degrees (50°) Fahrenheit. The thermoplastic material shall be applied to the pavement at a temperature between 400 degrees (400°) Fahrenheit and 425 degrees

(425°) Fahrenheit.

A primer, of the type recommended by the manufacturer shall be applied to all pavement surfaces over 6-months old. The thermoplastic material may be applied by either spray or extrusion method in a single uniform layer.

Thermoplastic material for both pavement markings and traffic stripes shall be applied at a thickness of 0.100 to 0.150 inch. Glass beads shall be applied immediately to the surface of the molten thermoplastic material at a rate not less than eight pounds per hundred square feet (8 lbs/100 sf).

The contractor shall not place pavement markings and markers on any manhole, valve, anode, detector handhole, or monument rim and cover. For lane striping, placement of markings or markers shall discontinue on the rim and cover and shall continue along the same alignment, as shown in the drawings. Any cover marked during the construction of the project shall be restored to its original condition or replaced, in kind, at the contractor's expense.

3.05 PAINT STRIPES AND MARKINGS

Paint is to be applied in conformance with the manufacturer's recommended instructions and the applicable requirements of Section 84-2.03C(3) of the State Standard Specifications.

3.06 ADHESIVES

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

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

3.07 RAISED PAVEMENT MARKERS

Pavement markers shall be installed in conformance with the requirements of Section 84, "Markers" of the State Standard Specifications.
The pavement markers shall be stored indoors and shall be protected from any source of moisture both during shipment and at the job site.

Pavement markers shall not be applied to new asphalt concrete surfacing or seal coats until the street surface has been opened to traffic for a period of not less than 7 days when hot melt bituminous adhesive is used, and not less than 14 days when epoxy adhesive is used.

Markers shall be installed accurately to the dimensions established in the Contract Documents and in an alignment approved in the form of Cat-Tracking by the Engineer.

3.08 REFLECTORIZED MARKERS AND DELINEATORS

Reflectorized markers and delineators shall be installed in conformance with the requirements of Section 81 "Miscellaneous Traffic Control Devices" of the State Standard Specifications.

Reflectorized markers and delineators shall be installed accurately at the locations called for in the Contract Documents or as required by the CA MUTCD.

The Contractor shall furnish and install a blue reflective marker for every fire hydrant.

3.09 CURB PAINTING

The temperature during application shall not be less than 50 degrees Fahrenheit. Curb shall be dry at least two days prior to application. Unless otherwise directed by the Engineer, existing curb and median island painting shall be repainted within the project limits, and all curb painting eliminated as a result of new curb and gutter improvements shall be restored.

3.10 PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS

The Contractor shall protect the newly installed pavement markers and thermoplastic stripes from damage until the material has cured or sufficiently hardened. Contractor shall replace any broken, misaligned or otherwise disturbed markings, prior to opening the roadway to traffic.

Existing signs or other markings removed or damaged due to the installation of roadway striping shall be replaced in kind. Existing landscaping or planting removed damaged or disturbed shall be replaced in kind.

3.11 CLEAN-UP

Upon completion of the installation of striping, the Contractor shall thoroughly clean the work site of all waste, rubbish, construction debris, drips, over-spray, improper markings and/or layout paint markings and tracked thermoplastic material; all of which shall be removed immediately from the pavement surface by methods approved by the Engineer.

3.12 REMOVE ROADSIDE SIGNS

Prior to removing existing signs or sign panels, Contractor shall obtain written authorization from the Engineer. Contractor shall remove the signs and hardware in manner to preserve the hardware and sign, including removing prior to removing signpost.

Posts and post foundations shall be removed by the Contractor. If a post is located in existing concrete, the Contractor shall sawcut and remove the entire flag of concrete. Post and post foundation hole shall be backfilled during the shift when it is removed.

Signs and hardware shall be thoroughly cleaned after removal. Engineer will approve the signs that will be re-installed. Signs not reinstalled shall become property of the Contractor.

The Contractor shall install new posts and attach the existing signs and hardware.

Signs shall be thoroughly cleaned and may be reused in the work. All posts shall be disposed at the Contractor’s expense and new signs shall be furnished by the Contractor and installed in accordance with County Standards.

3.13 PROJECT FUNDING SIGN, EDUCATIONAL SIGN, ROADSIDE SIGN (SALVAGED SIGN PANEL), AND REPLACEMENT SIGN PANEL

All sign types, locations and offsets shall be approved by the Engineer prior to installation and shall be installed as shown on the Drawings, unless otherwise detailed or directed by the Engineer. Construction and panel installation shall be per Section 82 of the State Standard Specifications. Sign panels shall be level or as shown on the plans and sign posts shall be plumb.

Where required, sign posts shall be set at least 30-inches into the ground and encased in concrete poured against undisturbed earth, with a minimum thickness of 6-inches of concrete at any point.

Sign posts for street signage shall be per the State Standard Specifications and the State Standard Plans. Signs shall be placed to have a minimum height of 7-ft as measured from the finished ground elevation to the bottom invert of the sign.

All sign locations shall be field verified by the Engineerprior to excavation for the sign foundation.

If Engineer does not approve the reinstallation of a sign or sign panel, Contractor shall furnish and install a the new sign to replace the sign not incorporated into the work.

PART 4 - MEASUREMENT AND PAYMENT

Included in Section 100 of these Technical Specifications.

END OF SECTION 111

SECTION 112

UTILITY STRUCTURE ADJUSTMENTS

PART 1 - GENERAL

1.01 GENERAL

The work performed in connection with adjusting various existing facilities shall conform to the provisions in Section 15, "Existing Highway Facilities," of the State Standard Specifications and these Technical Specifications. Work covered by this section includes adjusting utility frames, and covers to grade to match new roadway pavement grades.

Work covered by this section also includes:

- Survey (total station or GPS) recording and documenting of all utility cover locations within the pavement rehabilitation limits prior to grinding operations.
- Potholing and coordination with appropriate utility companies
- Lowering existing utility mains, services and laterals within public right of way and adjacent private properties to conform to the new depths of the impacted utility mains, services and laterals adjusted by the utility owners for the project.
- After paving operations, utilizing survey equipment again to relocate and mark the utility cover locations based on the recordings.

The purpose of the locating and surveying of utility covers is to prevent excess AC patch work during the “Utility Structure Adjustment” operation.

This project requires lowering of all existing utility mains, services, laterals and covers prior to full depth reclamation operation within public right of way and adjacent private properties, and adjustment to finished grade after paving.

Contractor shall be responsible for notifying and coordinating with the respective utility regarding any adjustment to affected utility structures within the limits of work. Contractor shall contact affected utilities within seven (7) calendar days from award of contract to allow for adjustment of their impacted utilities.

Any utility covers compromised and in need of replacing shall be brought to the immediate attention of the Engineer.

1.02 LIQUIDATED DAMAGES

Asphalt concrete around the raised utility shall be placed and compacted within twenty four (24) hours of raising the utility. Specific liquidated damages for utility adjustment delays shall be in the sum of one hundred dollars ($100) per calendar day per location.

PART 2 - MATERIAL AND EQUIPMENT

Topographic Survey equipment (such as total station equipment) or GPS equipment shall record the location of the utility covers to the accuracy of within 4 inches of the center of the utility cover.

Equipment and methods shall be approved by the Engineer prior to execution.

PART 3 – EXECUTION

3.01 UNDERGROUND SERVICE ALERT

The Contractor shall notify and coordinate the work of identifying and marking utility facilities with the respective utility companies. The Contractor is required to call Underground Service Alert (USA)

at (800) 227-2600 forty-eight (48) hours in advance of any excavation activity so all existing underground facilities can be located and marked. The Contractor shall supply the Engineer with copies of all USA confirmation numbers including associated documentation.

3.02 SURVEYING

The Contractor shall survey and record the locations of all utility covers and provide the Engineer with records.

After paving operations, the Contractor shall locate the utility covers using the survey equipment and mark the locations of the utility covers prior to “Utility Structure Adjustment” operations.

3.03 CONTROL

All reset frames and covers shall be within 1/4 inch of the bottom of a straight edge when placed across manhole, box or other facility on the finished pavement.

Contractor shall be responsible for locating and referencing all such facilities so that no utility cover is “lost”. Refer to the “Locating and Surveying Utilities” Technical Specification section.

For monuments, Contractor shall be responsible for preserving the survey point in its undisturbed position by a method acceptable to the Engineer.

3.04 ADJUST FRAMES, COVERS, GRATES, AND MANHOLES

All manholes, grates, valves, cleanouts and survey monuments shall be adjusted to finished grade in accordance with Section 15-2.10 of the State Standard Specifications.

Adjustment of covers shall begin within seven (7) days after paving.

Raising to grade of non-City utilities shall be coordinated with the appropriate utility company. Utility companies shall be notified a minimum of fifteen (15) days prior to the start of work.

In road areas where milling or conform grinding occurs ahead of the pavement overlay, the contractor shall lower the lids, grates and remove boxes prior to grinding, place covers and then raise the lids and grates and restore the boxes to match finished grade following final paving operations.

During initial lowering of utility frame and cover and prior to paving, Contractor shall compact the materials, including cutback if used, within the utility frame.

Contractor shall immediately repair any areas where temporary paving over structures has become loose or uneven.

3.05 CLEANING

All covers shall be completely cleaned of all asphaltic material.

3.06 CORRECTIVE WORK

Any frames, grates, or covers damaged by the Contractor while paving shall be replaced at his expense. Broken boxes shall be replaced by the Contractor and no additional compensation will be allowed.

PART 4 – MEASUREMENT AND PAYMENT

Included in Section 100 of these Technical Specifications.

END OF SECTION 112

SECTION 113

STORM DRAINAGE

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Trenching and other excavation.

B. Groundwater control.

C. Pipe bedding.

D. Installation of storm drains and appurtenances.

E. Installation of underdrains and appurtenances.

F. Backfill and compaction of backfill.

G. Dust alleviation and control.

H. Cleanup and restoration of surface in improved areas.

I. Supplying all labor, materials, equipment and apparatus not specifically mentioned herein or noted on the plans, but which are incidental and necessary to complete the work specified.

1.02 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text only by the general designation.

B. American Society for Testing and Materials (ASTM) Publications:

A – 34	Structural Steel.
A – 48	Gray Iron Castings.
A – 123	Zinc Coatings, Rolled, Pressed Forged Mat.
A – 386	Zinc Coating (Hot-Dip) on Assembled Steel Products.
C – 76	Reinforced Concrete Culvert.
C – 443	Joints for Circular Concrete Sewer and Culvert Pipe, using Rubber Gaskets.
C – 478	Precast Reinforced Concrete Manhole Sections.
C – 497	Method of Testing Concrete Pipe, Sections, or Tile.
D – 1784	Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride Compounds
D – 1785	Pipe, Polyvinyl Chloride (PVC) Schedules 40,80 and 120.
D – 2564	Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings.
D – 3034	PVC Sewer Pipe and Fittings
F – 477	Elastomeric Seals (Gaskets) for joining Plastic Pipe.
F – 679	Standard Specifications for Polyvinyl Chloride large Diameter Plastic gravity sewer pipe and fittings

1.03 QUALITY ASSURANCE

A. Submit manufacturer's data on pipe, drainage structure and castings to be used.

B. The Engineer may require manufacturer's or supplier's certificates showing conformance with this specification to be delivered with each shipment of material delivered to the job site.

C. D-Load or class of pipe requirements shown or called for on the plans shall be the minimum acceptable.

D. All pipes shall bear the manufacturer's label for the type, specification, and classification of the pipe.

E. All storm drains shall be subject to passing a ball test.

1.04 WORK SPECIFIED IN OTHER SECTIONS

Note and conform to conditions and requirements indicated and specified under Section 100 and 101 of these Specifications.

PART 2 – PRODUCTS

2.01 REINFORCED CONCRETE PIPE

A. Pipe 12 inches and larger shall be reinforced concrete, bell and spigot-type pipe, conforming to the requirements of ASTM Designation C76 except that all pipe shall have been manufactured using Portland Cement Concrete conforming to the requirements of Section 105 Concrete Improvements of these Technical Specifications.

B. Pipe strength requirements shall be designated in terms of D-load as shown or called for on the plans. D-load as used herein is defined as the maximum load the pipe will sustain per foot of length per foot of internal diameter under the standard three-edge bearing test without the appearance of any crack one one-hundredth (0.01) inch in width exceeding twelve (12) inches in length when tested in accordance with the procedure set forth in ASTM Designation C497.

C. Pipe wall thickness and bell and spigot mating surfaces shall be the same for each size and class or D-load of pipe delivered to the job site. The concrete cover over any reinforcement shall not be less than 1” for 12” RCP and 1-1/2” for 18” RCP.

D. Pipe shall be cured by water curing, steam curing, or a combination of both as required to produce the D-load strengths shown, noted or called for on the plans.

E. All reinforced concrete pipe shall have rubber gasket joints that are self-centering and so designed that after the joint is made up, the rubber gasket shall not be required to support the weight of the pipe. Spigot grooves shall be provided in all joints, and the joint and gasket shall conform to the requirements of ASTM Designation C443. All joints shall be watertight.

F. Pipe lengths shall not exceed twelve (12) feet for all pipe except that short lengths of pipe (two (2) feet nominal) shall be furnished and installed at all connections to structures and appurtenances.

G. Each section of pipe shall be clearly and legibly marked with waterproof paint to show the date of manufacture, the D-load classification of the pipe, and the type of cement used in the manufacture of the pipe.

2.02 POLYVINYL CHLORIDE PIPE

A. PVC pipe for minor storm drains less than twelve (12) inches in diameter shall conform to the requirements of ASTM 3034 or ASTM F-679 and shall have a DR rating of 26. All pipe and fittings shall be made of PVC plastic having a minimum cell classification of 12454-B or 13364-B as defined in ASTM D-1784. Pipe barrel shall have the words "STORM DRAIN" marked along the longitudinal

axis of the outside in 1-5/8" high block letters with permanent ink. The words shall be repeated at 2-foot spacing along the pipe length.

B. The Contractor may substitute pressure-sensitive tape in lieu of stenciling. Adhesive-backed Pipe Labeling Tape shall be PVC Plastic tape manufactured specifically for direct placement onto pipe, cable or conduit for warning and identification. Tape shall be a minimum of 2.2 mils, an adhesive strength of 26 psi, and with tensile strength of 32 lb. per inch of width. Tape shall be of the type provided in rolls, color coded for the utility involved with warning and identification imprinted in bold letters continuously and repeatedly over entire tape length. Code and letter coloring shall be permanent, unaffected by moisture or other substances contained in trench material.

C. Couplings and fittings for use with PVC non-pressure pipe shall be of the same materials and in compliance with the requirements specified for the pipe. Couplings and fittings shall be equipped with rubber rings which fit into individual grooves formed in the inner wall to the requirement of ASTM Designation F-477.

D. Joints shall be bell and spigot assembly with elastomeric sealing gaskets. Sealing gaskets shall meet the requirements of ASTM D1869.

2.03 PVC UNDERDRAINS

A. PVC underdrains shall consist of four (4) inch Schedule 40 perforated Polyvinyl chloride (PVC) pipe conforming to the requirements of ASTM Designation D1785. B. Joints and fittings for PVC underdrains shall conform to the requirements of ASTM Designation D1785.

B. Solvent cement for joining PVC underdrain pipe, couplings and fittings shall conform to the requirements of ASTM Designation D2564.

C. Permeable material bedding and cover for subsurface drains shall be as specified in Section 114 of these Specifications.

D. Filter Fabric for underdrains shall conform to Section 88 of the Standard Specifications.

2.04 STORM DRAIN MANHOLES

A. Barrel and cone sections for storm drain manholes shall be precast reinforced concrete of the form and dimensions shown and detailed on the plans and shall conform to the requirements of ASTM Designation C478. Concrete used for manhole barrel and cone sections shall conform to the requirements of Section 113 of these Specifications.

B. Frames and covers for manholes shall be gray iron castings of the form and dimensions shown and detailed on the plans and shall conform to the requirements of ASTM Designation A48 for Class 30B castings. Frames and covers shall be match marked in sets which have been machined after fabrication to provide a firm and continuous seat. Each cover shall have cast into it the raised letters "STORM DRAIN". All castings shall be thoroughly cleaned and coated with commercial quality asphaltic varnish prior to delivery.

C. Steps for manholes and other storm structures shall be polypropylene to the form and dimensions shown and detailed on the plans.

D. Concrete for manhole bases shall be Minor Concrete conforming to the requirements of Section 105 of these Technical Specifications.

E. Reinforcement for manhole bases shall be deformed steel bars conforming to Section 105 of these Technical Specifications. Size and shape of reinforcement shall conform to the details shown on the plans.

F. Mortar for precast manhole section joints shall consist of one (1) part Portland Cement conforming to the requirements of Section 105 of these Specifications, with two (2) parts of sand by volume. Sand shall be well graded and of such size that all will pass a No. 8 sieve.

G. Concrete for manhole frame anchor slabs shall be Minor Concrete conforming to the requirements of Section 105 of these Technical Specifications.

2.05 CONCRETE CURB INLETS

A. Concrete curb inlets for storm drains shall be cast in place, reinforced concrete of the form and dimensions shown and detailed on the plans.

B. Insert form for the curb inlet and other parts shall be as manufactured by Santa Rosa Cast Products, or approved equal. Concrete used in the construction of concrete curb inlets shall conform to the requirements for Minor Concrete set forth in Section 105 of these Specifications. Forming, placing and finishing shall conform to Section 105 of these Specifications.

C. Reinforcement used in the construction of precast curb inlets shall be deformed steel bars conforming to Section 105 of these Specifications.

D. Miscellaneous steel shapes used in construction of concrete curb inlets shall be structural quality carbon steel conforming to the requirements of ASTM.

E. Designation A36 and shall be hot-dip galvanized after fabrication in conformance with the requirements of ASTM Designation A123.

F. Steps for curb inlets, where required, shall be polypropylene to the form and dimensions shown and detailed on the plans.

2.06 CAST-IN-PLACE DRAINAGE STRUCTURES

A. All concrete structures are to be cast in place except where specifically noted on the plans and specifications.

B. Concrete for cast-in-place drainage structures shall be Minor Concrete conforming to the requirements of Section 105 of these Specifications.

C. Forming, placing and finishing concrete, and reinforcement for cast-in-place drainage structures shall conform to Section 105 of these Specifications.

D. Steel for frames and grates or covers for cast-in-place drainage structures shall be structural steel conforming to the requirements of ASTM Designation A36. Frames and grates or covers shall be fabricated to the form and dimensions shown and detailed on the plans and shall be hot-dip galvanized after complete fabrication in conformance with the requirements of ASTM Designation A386. Frames and grates or covers shall be match marked in sets which have been so constructed as to provide a firm and continuous seat.

E. Welding for frames and grates shall conform to the requirements of the American Welding Society for Arc and Gas Welding in Building Construction.

2.07 CURB DRAIN AND AREA DRAINS

Pipe: Face of curb outlets shall be three-inch (3”) diameter cast iron or ductile iron pipe and conform to ASTM designation and the Standard Details.

Wire Mesh: Shall be 6”x6” #10 gauge wire mesh, where applicable.

PART 3 – EXECUTION

3.01 POTHOLING, TRENCHING, BACKFILLING, AND SHORING

The Contractor shall pothole utilities to verify their location. Contractor shall be responsible for contacting utilities and coordinating work around other utilities. The Contractor shall be responsible for the immediate repair of any underground utilities or sewers damaged during excavation at no additional cost to the City.

1. Clearly paint the location of all affected utility underground pipes, conduits and other utilities on the pavement or identify the location with suitable markers if not on pavement. In addition to the location of metallic pipes and conduits, non-metallic pipe, ducts and conduits shall also be similarly located using surface indicators and shall then be similarly marked.
2. Coordinate with the utility owner to have an inspector present during excavation, if required.
3. After the utility survey is completed, commence "potholing" to determine the actual location and elevation of all utilities where crossings, interferences, or connections to the new pipelines are shown on the Drawings, marked by the utility companies, or indicated by surface signs. Prior to the preparation of piping shop drawings, or the excavation for any new pipelines or structures, the Contractor shall locate and uncover these existing utilities including services and laterals to a point 1 foot below the utility. Submit a report identifying each underground utility and its depth and station. Any variation in the actual elevations and the indicated elevations shall be brought to the Engineer’ attention.
4. Excavations around underground electrical ducts and conduits shall be performed using extreme caution to prevent injury to workmen or damage to electrical ducts or conduits. Similar precautions shall be exercised around gas lines, telephone and television cables.
5. Excavations for potholing shall be minimized. Air spades and vacuum excavators shall be used to limit the size of excavations and damage to adjacent facilities. Backfill after completing potholing. In existing streets, temporarily pave with 1 inch of cutback.

The Contractor is solely responsible for furnishing, placing, maintaining and, except as shown or specified otherwise, removing all bracing and shoring in accordance with applicable law, including local ordinances, applicable OSHA, CalOSHA, California Civil Code, and California Department of Industrial Safety Orders.

Trenches shall not be left open during non-working hours. Contractor shall install devices to secure the work area from the public at all times.

All piping in the ground shall have a minimum cover of 1’-6”, except as otherwise shown on the Plans, and shall be laid in ditches dug true to grade and line, avoiding sharp breaks. Piping shall bear equally over its entire length at bottom of ditch. Rock or unstable material encountered at grade shall be replaced with bedding material to a depth of 6 inches below pipe.

3.02 PIPE INSTALLATION

A. Installation: Storm drain pipe, underdrains and appurtenances shall be installed in accordance with the best practice, and in conformance with the plans and these Specifications.

B. Handling: Pipe shall be carefully handled during hauling, unloading, and placing operations, so as to avoid breakage or damage. Strap-type slings shall be used for lifting and placing; no chains or hooks will be permitted. Broken or damaged pipe including chipped bells of spigots, will be rejected, and shall be removed from the work site.

C. Alignment: All pipe shall be accurately laid in conformity with the prescribed lines and grades as established by the Engineer. Each length shall be joined to the preceding section as specified, and after said jointing has been completed, there shall be no movement of the pipe in subsequent operations.

D. Pipe Deflections: The laying of pipe on curved alignment will be permitted only when necessary to conform with the alignment shown or called for on the plans. Joint deflections called for on the plans shall be permitted up to one half of the deflection recommended by the pipe manufacturer.

E. Cleaning: Before each new length of pipe is placed, the interior of the preceding pipe shall be carefully cleaned of all dirt and debris. When pipe laying is not in progress, all open pipe ends shall be closed with plugs in a satisfactory manner to the Engineer.

F. Bearing: Pipe in the trench shall have continuous uniform bearing along its bottom, except all bell holes. Before lowering pipe into the trench, the Contractor shall remove all stakes, debris, loose rock and other hard material from the bottom of the trench.

G. Positioning: After the final positioning, pipe shall be held in place in the trench with cover materials placed equally on both sides of the pipe at as many locations as required to hold the pipe section in place. Position plastic pipe with "STORM DRAIN" markings facing up. After joints are completed, the cover material shall be redistributed and compacted as herein required.

H. Closure: At the end of each day and when work is not in progress, the open ends of pipe installed in the line shall be closed with plugs and openings for appurtenances shall be suitably covered.

3.03 CONNECTIONS

A. Unless separately listed on the bid schedule, make all required connections to existing facilities and improvements at no additional cost, and compensation for such work shall be deemed as included in the price bid for pipe installation.

B. All connections to manholes shall be constructed with concrete channels directed toward outlet pipe as shown and detailed on the plans.

C. Break-out holes in manholes for connecting new pipe shall be grouted all around to prevent ground water infiltration. Pipes shall be cut off flush with the inside surface of the manhole. Use PVC manhole adapters in break-out holes in manholes for connecting new PVC pipe and grout all around to prevent ground water infiltration. Pipes shall be cut off flush with the inside surface of the manhole.

D. A 2-foot nominal length of pipe shall be used when entering and leaving all manholes and structures.

3.04 STRUCTURES

A. Structures and appurtenances shall be installed at the location and to the lines and dimensions shown on the plans and detail drawings.

B. Structures shall be constructed and/or installed in conformance with the applicable requirements of Section 51 of the State Standard Specifications. Unless otherwise noted on the plans or detail

drawings, all exposed surfaces of poured in place structures and appurtenances shall have a Class 1 surface finish.

C. Frames for manholes and tops of catch basins, inlets and other structures in paved areas shall be accurately placed flush with and in the plane of the finish pavement. All manhole frames in paved area shall be secured by means of concrete anchor slabs as shown and detailed on the plans and detail drawings.

D. All joints and pipe openings on manhole sections, risers, and grade adjustment rings shall be grouted smooth and flush with the interior of the structure in a workmanlike manner.

3.05 STORM DRAIN PLUGS & CLEANING

A. Where called for on the plans or directed, plugs shall be placed in open ends of storm drains. Plugs shall consist of a brick and mortar wall not less than eight (8) inches in thickness constructed in such a manner as to ensure a watertight seal. Mortar for plugs shall conform to the requirements of paragraph 2.04F hereof.

B. Storm drain pipe and structures shall be cleaned of all dirt, debris, and form work.

C. Pipes shall be balled with an approved rubber ball to ensure cleanliness prior to acceptance.

3.06 UNDERDRAINS

A. Trenches for underdrains shall be excavated in the location shown.

B. Place filter fabric in the trench to protect the permeable material and pipe prior to backfilling.

C. The pipe installed and the trench backfilled with permeable material according to the dimensions and details shown on the plans.

D. Perforated pipe, fabric, and permeable material shall be installed in accordance with Section 68-1.03 of the Standard Specifications.

PART 4 - MEASUREMENT AND PAYMENT

Included in Section 100 of these Technical Specifications.

END OF SECTION 113

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SECTION 114

BIORETENTION SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Work shall consist of all site work required to construct the bioretention areas as described in the Contract Drawings.

B. Bioretention Drainage System: Furnishing and installing cleanout and perforated and non-perforated underdrain.

C. Energy Dissipator: furnishing and installing streambed cobbles set in concrete.

D. Streambed Cobbles: furnishing and installing streambed cobbles.

E. Furnishing and installing water service connections for the bioretention area irrigation systems, including water service tubing in accordance with the Contract Drawings.

1.02 WORK SPECIFIED UNDER OTHER SECTIONS

A. Consult all other sections to determine extent and character of work specified elsewhere but related to that included in this section. Work specified herein shall be properly coordinated with that specified.

B. Section 105, “Concrete Improvements”, of these Technical Specifications.

C. Section 113, “Storm Drainage”, of these Technical Specifications.

D. Section 115, “Bioretention Planting”, of these Technical Specifications.

E. Section 117, “Planting”, of these Technical Specifications.

F. Section 118, “Planting Irrigation”, of these Technical Specifications

G. Section 119, “Landscaping Soil Preparation”, of these Technical Specifications.

H. Section 120, “Landscaping Maintenance”, of these Technical Specifications.

1.03 SUBMITTALS

Contractor shall submit certificates from the suppliers stating compliance of the materials with the requirements of this section.

1.04 STORAGE

A. Materials not installed on the day of arrival at the site shall be stored and protected as follows:
   a. Outside storage shall be shaded and protected from the sun and wind.
   b. Materials stored on the project shall be protected from drying out at all times.

B. Storage of materials shall be only in areas designated or as approved by the Owner.

C. Handling - Care shall be taken to avoid contamination of materials with existing soils or construction debris.

1.05 QUALITY STANDARDS

All work to be in accordance with the latest Safety Orders of the Division of Industrial Safety, O.S.H.A., and applicable State and local laws or regulations.

PART 2 - PRODUCTS

2.01 DRAINAGE SYSTEM:

A. Perforated Plastic Pipe: Perforated plastic pipe shall be smooth inner and outer-walled (not corrugated). In addition, perforated plastic pipe shall conform to the following requirements:
   a. Shall be Solvent-Weld.
   b. SDR-35.
   c. Pipe material shall be PVC.
   d. Perforations shall consist of two rows of holes ½" in diameter on 5" centers and 120" apart.
   e. Shall meet ASTM D3034 and D2729.

B. Non-Perforated Plastic Pipe: Nonperforated plastic pipe shall be smooth inner and outer-walled (not corrugated). In addition, non-perforated plastic pipe shall conform to the requirements below:
   a. Shall be Solvent-Weld.
   b. SDR-35.
   c. Pipe material shall be PVC.
   d. Shall meet ASTM D3034 and D2729.

C. Cleanouts: Cleanouts shall consist of nonperforated plastic pipe conforming to Part B, above, with a male pipe thread plug to close off the end of a 6" drain pipe, suitable for use with PVC pipe.

2.02 ENERGY DISSIPATOR

A. Refer to Section 115, "Bioretention Planting", of these Technical Specifications for Streambed Gravel.

B. Refer to Section 105, "Concrete Improvements", of these Technical Specifications for Streambed Gravel.

2.03 STREAMBED COBBLES

Refer to Section 115, "Bioretention Planting", of these Technical Specifications for Streambed Gravel.

2.04 WATER SERVICE CONNECTION

Contractor shall construct water service including connection to the City of East Palo Alto's water main, including service tubing, corporation stop, and other appurtenances, shall comply with the requirements set forth in the San Mateo County's Standard Details. Water Meter will be supplied and installed by the City; other materials shall be furnished by the Contractor. The Contractor shall install the new water service, including the connection to City's water main pipe in Bay Road. Contractor shall notify Engineer 1 week in advance to schedule the water meter installation. The contractor shall not connect to the City water main pipe without prior approval from the City.

2.05 IRRIGATION SLEEVE

Irrigation sleeve shall conform to Section 20-2.07, "Irrigation Conduit", of the State Standard

Specifications.

PART 3 – EXECUTION

3.01 EXCAVATION AND EARTHWORK

Contractor shall be aware that the existing water, electric, and gas lines and service laterals shown on the project plans are per record data and shall be potholed to verify location prior to construction. During excavation in the bioretention area, contractor shall use extreme caution when working over existing underground utility pipe lines. Contractor shall exercise care to avoid damaging existing lines where lines may be shallow. If an existing pipe line or utility structure is damaged by the Contractor, the Contractor shall repair the damage at their own expense.

3.02 PIPE INSTALLATION

PVC Pipe: Installation shall be performed in accordance with the manufacturer's recommendations and these specifications by open trench method. Pipe laying shall begin at the lowest point and proceed upslope. Each joint of pipe shall be laid true to line and grade and in such a manner as to form a close concentric joint with the adjoining pipe and to prevent an offset in the flowline of the pipe. As work progresses, the interior of the sewer pipe shall be cleared of dirt and debris. Pipe shall not be laid in conditions of unsuitable weather or soil conditions. At times when work is not in progress, open ends of pipes and fittings shall be closed.

Before pipe is placed in position in the trench, the bottom and sides of the trench shall be carefully prepared, the required bedding placed, and bracing and sheeting installed where required. The trench shall be excavated to the required depths to meet the invert elevations show on plan. Each pipe shall be accurately placed to the line and grade called for on the Plans.

All pipe and fittings shall be inspected by the Engineer before they are placed in the trench.

No connection shall be made where joint surfaces and joint materials have been soiled by earth or embedment in handling until such surfaces are thoroughly cleaned.

As the work progresses, the interior of all pipes shall be kept clean. After each line of pipe has been laid, it shall be carefully inspected and all earth, trash, rags, and other foreign matter removed from the interior.

Backfilling of trenches shall not be started until the Engineer has inspected the pipe. Backfill material, placement and compaction shall be placed in conformance with the project plans and County Standard Specifications and Details.

Cement Mortar: Mortar shall be composed of one part Portland cement and 2 parts sand by volume. Sand shall be well graded and of such size that all will pass a No. 8 sieve. The materials shall be mixed to a consistency suitable for the purpose intended. Mortar shall be used within 30 minutes after the mixing water has been added. Other joint sealant materials which will prevent leakage and infiltration may be used, if approved by the Engineer.

3.03 FLUSHING, TESTING, AND TV INSPECTION

After the new storm drain system is installed and the existing system connections are complete, the Contractor shall flush the line of all debris to a downstream manhole or catch basin where debris shall be completely removed. Debris shall not be allowed to pass downstream into the drainage system.

After installation, perform a low pressure air test in conformance with SSPWC Section 306-1.4.4 “Air Pressure Test”. Check integrity of joints that have been made and verify that pipe was not

damaged by backfilling operations.

The Contractor shall perform post-installation inspection after installation and shall provide the Engineer with a standard video, written to DVD, showing completed work with no defects.

3.02 DRAINAGE SYSTEM INSTALLATION

A. Area Drain (Convert Ex Curb Inlet to Field Inlet): Holes shall be drilled in the side of the catch basin for the perforated subdrain tubing. Pipes shall be connected to the catch basin in accordance with the applicable County Standard Detail(s).

B. Perforated Pipe Subdrain: The perforated plastic tubing shall be placed near the top of the Class 2 Permeable Material layer as shown on plans, and shall extend along the entire length of the bioretention to approximately 2' from each end, where it shall be connected to the non-perforated plastic tubing cleanout system. The pipe shall have the perforations pointing down, and maintain a minimum slope of 0.5%.

C. Perforated and non-perforated pipe subdrain shall be installed per manufacturer guidelines, and in accordance with ASTM D2321.

D. Cleanouts: The subdrain system shall include cleanouts at all points of terminus. Cleanout snap caps shall be placed at finished grade.

3.03 ENERGY DISSIPATOR

Streambed cobbles shall be set in concrete in accordance with the Contract Drawings. When placing the energy dissipator, avoid compaction of the bioretention soils.

3.04 STREAMBED COBBLES

Streambed cobbles shall be placed loosely in accordance with the Contract Drawings. When placing the streambed cobbles, avoid compaction of the bioretention soils.

3.05 IRRIGATION SLEEVE

A. Handling and Storage: Handle plastic pipe carefully, especially protecting it from prolonged exposure to sunlight.

B. Construction: Construction of irrigation sleeve shall conform to Section 2-2.07, "Irrigation Conduit", and 20-2.07C, "Construction", of the State Standard Specifications. At the Contractor's option, install the irrigation sleeve by open trench. If installed by open trench, the following conditions will apply:

a. Trench size shall be a minimum of 5 times the conduit diameter deep and 2 times the conduit diameter wide.
b. Depth of trenches shall be enough to provide minimum cover from finish grade to top of pipe in trenches. Provide a minimum of 24-inches of cover over sleeves.
c. Restore surfaces, existing underground installations, etc., damaged or cut as a result of excavations, to original conditions in a manner approved by the Engineer.
d. Where other utilities interfere with irrigation trenching and pipe work, adjust the trench depth as instructed by the Engineer.
e. Refer to Section 114 "Planting Irrigation" for Trenching and Backfilling requirements.

3.06 WATER SERVICE CONNECTION

Contractor shall construct the new water service, including service tubing, corporation stop, and other appurtenances, which shall comply with the applicable County Standard Details, and include a reduce pressure principle backflow prevention device, and other appurtenances complying with the County Standard Details. The Contractor will coordinate with City forces for the water meter installation.

3.07 ELECTRICAL CONNECTION

Contractor shall construct the conduit and conductors in a trench from the proposed irrigation controller to the City of East Palo Alto lighting system box located near the light pole on the north-east side of Bay Road, that is, across Bay Road.

PART 4 - MEASUREMENT AND PAYMENT

Included in Section 100 of these Technical Specifications.

END OF SECTION 114

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SECTION 115

BIORETENTION PLANTING

PART 1 – GENERAL

1.01 WORK INCLUDED

i. Aggregate Storage.

ii. Bioretention Soil Mix.

iii. Bioretention Planting.

iv. Mulch.

Supplying all labor, materials, equipment, and apparatus not specifically mentioned herein or noted on the plans, but which are incidental and necessary to complete the Work specified, including but not limited to soil sampling and testing, top soil placement, soil preparation, planting and maintenance period.

1.02 APPLICABLE PUBLICATIONS

This section incorporates by reference the latest versions of the following documents. These references are a part of this section as specified and modified.
Reference Standards:

Reference	Title
Caltrans	Standard Specifications
ASTM	Annual Book of ASTM Standards, American Society for Testing and Materials, Philadelphia, PA, 1997 or latest edition.

1.03 WORK SPECIFIED UNDER OTHER SECTIONS

Consult all other sections to determine extent and character of work specified elsewhere but related to that included in this section. Work specified herein shall be properly coordinated with that specified.

Section 117, “Planting”, of these Technical Specifications.

Section 118, “Planting Irrigation”, of these Technical Specifications.

Section 119, “Landscaping Soil Preparation”, of these Technical Specifications.

Section 120, “Landscaping Maintenance”, of these Technical Specifications.

1.04 SUBSTITUTIONS

Any substitutions of materials for any reason shall have prior approval from Landscape Architect.

1.05 DEFINITIONS

Bioretention Soil Mix (BSM): A soil mix that has been specially blended and tested for use in bioretention facilities with the intent to meet the following objectives:

Infiltrate runoff at a minimum rate of 5 inches per hour throughout the life of the facility, and
By nature of its components be capable of the removal of certain suspended and dissolved stormwater pollutants, and have sufficient moisture retention and other agronomic properties to support healthy vegetation.

PART 2 - SUBMITTALS

2..01 PRE-INSTALLATION SUBMITTALS:

The Contractor shall submit to the Engineer the following, a minimum of 20 calendar days (or as directed by the Engineer) prior to the construction of bioretention facilities:

(1) BSM Submittals
  (a) Two one (1) gallon samples of the BSM.
  (b) Source certificates for all BSM materials.
  (c) Sieve analysis of BSM per ASTM D422 performed within two (2) months of product delivery to site.
  (d) Certification from the soil supplier or an accredited testing agency that the BSM, including sand and compost components, conforms to all industry or technical society reference standards specified in Section 2.01.
  (e) A description of the equipment and methods used to mix the sand and compost to produce BSM.
  (f) Organic content test results of the BSM, performed in accordance with Testing Methods for the Examination of Compost and Composting (TMECC) 05.07A, “Loss-On-Ignition Organic Matter Method.”
  (g) Permeability test results for BSM per ASTM D2434 (Modified).

(2) Sand Submittals
  (a) Grain size analysis of sand component performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils, performed within two (2) months of product delivery to site.

(3) Compost Submittals
  (a) Quality analysis results for compost performed in accordance with Seal of Testing Assurance (STA) standards, performed within two (2) months of product delivery to site.
  (b) Grain size analysis of compost component performed in accordance with ASTM D 422, Standard Test Method for Particle Size Analysis of Soils.

(4) Other Submittals
  (a) Copy of orders from Contractor to suppliers for plant materials.
  (b) Testing agency qualifications as specified in Section 1.05.B.

2.02 QUALITY CONTROL AND QUALITY ASSURANCE

General: Test and inspect bioretention materials and operations as Work progresses as described in this section. Failure to detect defective Work or materials at any time will not prevent rejection if a defect is discovered after installation, nor shall it constitute final acceptance.

Testing Agency Qualification:
General: Agencies that perform testing on bioretention materials, including permeability testing, shall be accredited by STA, ASTM, AASHTO, or other designated recognized standards organization. All certifications shall be current. Testing agency shall be capable of performing all tests to the designated and recognized standards specified and shall provide test results with an accompanying Manufacturer’s Certificate of Compliance. The following information shall be provided for all testing laboratories used:

- Name of lab(s) and contact person(s)

- Address(es) and phone number(s)
- Email address(es)
- Qualifications of laboratory and personnel including the date of current certification by USCC, Caltrans, STA, ASTM, AASHTO, or approved equal.

Compost: Laboratory that performs testing shall be independent, enrolled in the US Composting Council's (USCC) Compost Analysis Proficiency (CAP) program, and perform testing in accordance with USCC Test Method for The Examination of Composting and Compost (TMECC). The sample collection protocol can be obtained from the U.S. Composting Council, 4250 Veterans Memorial Highway, Suite 275, Holbrook, NY 11741, 631-737-4931, *www.compostingcouncil.org*.

Responsibilities of Contractor:
Submittals: Some of the tests required for this specification are unique, and BSM shall be considered a long-lead-time item. Under no circumstance shall failure to comply with all specification requirements be an excuse for a delay or for expedient substitution of unacceptable material(s). The requirements of Division 0 apply in their entirety.
Testing: All testing specified herein is the responsibility of the Contractor and shall be conducted by an independent testing agency, retained by the Contractor. The Owner reserves the right to conduct additional testing on all materials submitted, delivered, or in-place to ensure compliance with Specifications.

2.03 DELIVERY, STORAGE, AND HANDLING

Protect the BSM and mulch from contamination and all sources of additional moisture at supplier site, during transport, and at the project site, until incorporated into the Work.

The Contractor is required to coordinate delivery of BSM and aggregates with bioretention facility excavation and soil installation. A written schedule shall be submitted for review as part of the submittal package. BSM should not be stockpiled onsite for any length of time. In no case shall BSM be stockpiled onsite for more than 24 hours without prior written approval by the Engineer. If stockpiling onsite for any length of time, BSM stockpiles shall meet the following requirements:

- Locate stockpiles away from drainage courses, inlets, sewer cleanout vents, and concentrated stormwater flows.
- Place stockpiles on geotextile fabric.
- Cover stockpiles with plastic or comparable material.
- Contain stockpiles (and prevent contamination from adjacent stockpiles) with temporary perimeter barrier (e.g., sand bags, wattles, silt fence).

PART 3 – MATERIALS AND EQUIPMENT

3.01 AGGREGATE STORAGE MATERIAL

Aggregate Storage Material shall be Class II Permeable Material conforming to Section 68-2.02F, "Permeable Material", of the State Standard Specifications.

3.02 BIORETENTION SOIL MIX (BSM)

General: BSM shall be a well-blended mixture of sand and compost, shall have sufficient moisture retention to support healthy plant growth, and shall meet the following criteria:
Bioretention soil shall achieve a long-term, in-place infiltration rate of at least 5 inches per hour. Bioretention soil shall support vigorous plant growth.

Mixture proportions: 30 to 40 percent Compost by volume and 60 to 70 percent Sand by volume

Organic matter content: 4 to 8 percent as determined by TMECC 05.07-A, Loss on Ignition Method.

Extraneous materials: BSM shall be free of all roots, plants, weeds, sod, stones, clods, pockets of coarse sand, construction debris, or other extraneous materials harmful to plant growth.

Permeability/Saturated Hydraulic Conductivity: 10 inches per hour (minimum) tested in accordance with ASTM D2434 (Modified).

Acceptance of BSM quality and performance may be based on samples taken from stockpiles at supplier's yard, submitted test results, and/or onsite and laboratory testing of installed material at the discretion of the Engineer/Landscape Architect. The point of acceptance will be determined in the field by the Engineer/Landscape Architect.

3.03 SAND

Sand shall be free of wood, waste, coating such as clay, stone dust, carbonate, etc., or any other deleterious material. All aggregate passing the No. 200 sieve size shall be nonplastic.
Sand for Bioretention Soils shall be analyzed by an accredited lab using #200, #100, #40 or #50, #30, #16. #8, #4, and 3/8 inch sieves (ASTM D 422, CTM 202 or as approved by municipality), and meet the following gradation:

Sieve Size	**Percent Passing (by weight)**	
	Min	***Max***
3/8 inch	100	100
No. 4	90	100
No. 8	70	100
No. 16	40	95
No. 30	15	70
No. 40 or No.50	5	55
No. 100	0	15
No. 200	0	5

Note: all sands complying with ASTM C33 for fine aggregate comply with the above gradation requirements.

Acceptance of grading and quality of the sand may be based on samples taken from stockpiles at supplier's yard or a submitted gradation report at the discretion of the Engineer. The point of acceptance will be determined in the field by the Engineer.

3.04 COMPOSTED MATERIAL

Compost shall be a well decomposed, stable, weed free organic matter source derived from waste materials including yard debris, wood wastes or other organic materials not including manure or biosolids meeting the standards developed by the US Composting Council (USCC). The product shall be certified through the USCC Seal of Testing Assurance (STA) Program (a compost testing and information disclosure program).

a. Compost Quality Analysis by Laboratory – Before delivery of the soil, the supplier shall submit a copy of lab analysis performed by a laboratory that is enrolled in the US

Composting Council's Compost Analysis Proficiency (CAP) program and using approved Test Methods for the Examination of Composting and Compost (TMECC). The lab report shall verify:

(1) Organic Matter Content: 35% - 75% by dry wt.
(2) Carbon and Nitrogen Ratio: C:N < 25:1 and C:N >15:1
(3) Maturity/Stability: Any one of the following is required to indicate stability:
  (i) Oxygen Test < 1.3 O2 /unit TS /hr
  (ii) Specific oxy. Test < 1.5 O2 / unit BVS /hr
  (iii) Respiration test < 8 mg CO2-C /g OM / day
  (iv) Dewar test < 20 Temp. rise (°C) e.
  (v) Solvita® > 5 Index value
(4) Toxicity: Any one of the following measures is sufficient to indicate non-toxicity.
  (i) NH4 + : NO3- - N < 3
  (ii) Ammonium < 500 ppm, dry basis
  (iii) Seed Germination > 80 % of control
  (iv) Plant Trials > 80% of control
  (v) Solvita® = 5 Index value
(5) Nutrient Content: provide analysis detailing nutrient content including N-P-K, Ca, Na, Mg, S, and B.
  (i) Total Nitrogen content 0.9% or above preferred.
  (ii) Boron: Total shall be <80 ppm;
(6) Salinity: Must be reported; < 6.0 mmhos/cm
(7) pH shall be between 6.2 and 8.2 May vary with plant species.

b. Compost Quality Analysis by Compost Supplier – Before delivery of the compost to the soil supplier the Compost Supplier shall verify the following:

(1) Feedstock materials shall be specified and include one or more of the following: landscaping/yard trimmings, grass clippings, food scraps, and agricultural crop residues.

(2) Maturity/Stability: shall have a dark brown color and a soil-like odor. Compost exhibiting a sour or putrid smell or containing recognizable grass or leaves, or is hot (120F) upon delivery or rewetting is not acceptable.

(3) Weed seed/pathogen destruction: provide proof of process to further reduce pathogens (PFRP). For example, turned windrows must reach min. 55C for 15 days with at least 5 turnings during that period.

c. Compost for Bioretention Soil Texture – Compost for bioretention soils shall be analyzed by an accredited lab using #200, 1/4 inch, 1/2 inch, and 1 inch sieves (ASTM D 422 or as approved by municipality), and meet the following gradation:

Sieve Size	**Percent Passing (by weight)**	
	Min	**Max**
1 inch	99	100
1/2 inch	90	100
1/4 inch	40	90
No. 200	1	10

d. Bulk density shall be between 500 and 1100 dry lbs/cubic yard
e. Moisture content shall be between 30% - 55% of dry solids.
f. Inerts – compost shall be relatively free of inert ingredients, including glass, plastic and paper, < 1 % by weight or volume.
g. Select Pathogens – Salmonella <3 MPN/4grams of TS, or Coliform Bacteria <10000 MPN/gram.
h. Trace Contaminants Metals (Lead, Mercury, Etc.) – Product must meet US EPA, 40 CFR 503 regulations.

i. Compost Testing – The compost supplier will test all compost products within 120 calendar days prior to application. Samples will be taken using the STA sample collection protocol. (The sample collection protocol can be obtained from the U.S. Composting Council, 4250 Veterans Memorial Highway, Suite 275, Holbrook, NY 11741 Phone: 631-737-4931, *www.compostingcouncil.org*). The sample shall be sent to an independent STA Program approved lab. The compost supplier will pay for the test.

Sources of Bioretention Soil can be found at:
http://www.flowstobay.org/sites/default/files/SMCWPPP%20Biotreatment%20Soil%20Supplier%20list%20-%2008-11-2017.pdf

3.05 MULCH

Refer to Section 117, “Planting”, of these Technical Specifications. And in other subsections of these Technical Specifications.

3.06 STREAMBED GRAVEL

Streambed Cobbles shall be clean, naturally occurring water rounded gravel material. Streambed Cobbles shall have a well-graded distribution of cobble sizes and conform to the following gradation:

Streambed Cobbles	
Approximate Size[1]	**Percent Passing by Weight**
6”	99-100
5”	70-90
2”	30-60
¾“	10 max

[1] Approximate size can be determined by taking the average dimension of the three axes of the rock, Length, Width, and Thickness, by use of the following calculation: (Length + Width + Thickness)/3 = Approximate Size Length is the longest axis, width is the second longest axis, and thickness is the shortest axis.

The grading of the cobbles shall be determined by the Engineer by visual inspection of the load before it is dumped into place, or, if so ordered by the Engineer, by dumping individual loads on a flat surface and sorting and measuring the individual rocks contained in the load. Cobbles must be washed before placement.

PART 4- EXECUTION

Prevent runoff from adjacent pervious and impervious surfaces from entering the bioretention facility (e.g., sand bag inlet curb cuts, stabilize adjacent areas, flow diversion) until authorization is given by the Engineer.

Exclude equipment from bioretention facilities. No equipment shall operate within the facility once bioretention facility excavation has begun, including during and after excavation, backfilling, mulching, or planting.

Store and protect materials so as to prevent contamination with other materials. Prevent foreign materials and substances, such as silt laden run-off, construction debris, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid from entering or being stored in the facility at any point during construction.

4.01 GRADING

The Contractor shall not start bioretention facility grading until all areas draining to the facility are stabilized and authorization has been given by the Engineer.

Construct bioretention facility subgrade to +/- 3/4 inch of the grades and slopes specified on the Plans.

Excavation within 6 inches of final native soil grade shall not be permitted if facility soils have standing water or have been subjected to more than 1/2 inch of precipitation within the previous 48 hours.

Aggregate Storage Material shall be placed on non-compacted native soil to the required height as shown on the Contract Drawings. The elevation of the bottom of the permeable rock is to remain relatively flat.

Contractor shall be responsible for maintaining finish grades in all bioretention areas and for executing any fine grading as may be necessary or incidental to all planting operations.

4.02 SUBGRADE PREPARATION AND PROTECTION

Protect the bioretention excavation from over compaction and/or contamination.

Areas which have been over compacted by equipment or vehicle traffic or by other means and which need to be ripped, over excavated, receive additional scarification, or other restorative means shall be done at the Contractor's expense and at the direction of the Engineer.

Excavated areas contaminated by sediment laden runoff prior to placement of BSM or Aggregate Storage material shall be remediated at the Contractor's expense by removing the contaminated soil (top 3 inches minimum) and replacing with a suitable material, as determined by the Engineer.

Remove all trash, debris, construction waste, cement dust and/or slurry, rocks over two (2) inches in size, or any other materials that may impede infiltration into prepared subgrade.

When excavating, avoid spreading fines of the soils on the bottom and side slopes.

The subgrade shall be inspected and accepted by the Engineer prior to placement of any materials or final subgrade scarification.

Scarify the surface of the subgrade to a minimum depth of six (6) inches immediately prior to placement of aggregate storage material. Acceptable methods of scarification include use of excavator bucket teeth or a rototiller to loosen the surface of the subgrade.

Place aggregate storage material, where shown on drawings with conveyor belt or with an excavator or loader from a height no higher than 6 feet unless otherwise approved by the Engineer (i.e., do not dump material directly from truck into cell).

Aggregate Storage areas contaminated by sediment-laden runoff prior to placement of BSM shall be remediated at the Contractor's expense by removing the contaminated aggregate storage material (top 3 inches minimum or as directed by the Engineer) and replacing with clean aggregate storage material per Section 2.03, to the lines and grades on the Plans.

Aggregate Storage material shall be inspected and accepted for placement and finish grade by the Engineer prior to the installation of BSM. Any material that does not conform to this Specification shall be removed and replaced with acceptable material or remediated to the satisfaction of the

Engineer, at the Contractor's expense.

4.03 BIORETENTION SOIL MIX PLACEMENT

The Contractor shall not place BSM until the Engineer has reviewed and confirmed the following:

BSM delivery ticket(s): Delivery tickets shall show that the full delivered amount of BSM matches the product type, volume and manufacturer named in the submittals. Each delivered batch of BSM shall be accompanied by a certification letter from the supplier verifying that the material meets specifications and is supplied from the approved BSM stockpile.

Visual match with submitted samples: Delivered product will be compared to the submitted 1-gallon sample, to verify that it matches the submitted sample. The Engineer/Landscape Architect may inspect any loads of BSM on delivery and stop placement if the soil does not appear to match the submittals; and require sampling and testing of the delivered soil to determine if the soil meets the requirements of Section 2.01 before authorizing soil placement.

Inspection of the aggregate storage layer, underdrain, cleanout, and overflow structure installation, where included on the plans.

BSM placement, grading and consolidation shall not occur when the BSM is excessively wet, or has been subjected to more than 1/2 inch of precipitation within 48 hours prior to placement. Excessively wet is defined as being at or above 22 percent soil moisture by a General Tools & Instruments DSMM500 Precision Digital Soil Moisture Meter with Probe (or equivalent). A minimum of three readings with the soil moisture probe will be used to determine the average percent soil moisture reading per each truck load. There should be no visible free water in the material.

The Contractor shall place BSM loosely with a conveyor belt or with an excavator or loader from a height no higher than 6 feet, unless otherwise approved by the Engineer/Landscape Architect (i.e., do not dump material directly from truck into cell). Soil shall be placed upon a prepared subgrade in accordance with these Specifications and in conformity with the lines, grades, depth, and typical cross-section shown in the Drawings or as established by the Engineer/Landscape Architect.

Excessively dry BSM may be lightly and uniformly moistened, as necessary, to facilitate placement and workability.

BSM shall be spread in all planting areas as noted on the plans in sufficient depth that when broken down, leveled, and settled, the resultant thickness shall not be less than eighteen (18) inches. Finished surfaces shall be smooth, true to slopes and grades. Import soil and level of planting areas shall be one (1) inch below top of pavements, walks and curbs. Particular attention shall be given to the installation of surface drainage swales.

Compact BSM using non-mechanical compaction methods (e.g., boot packing, hand tamping, or water consolidation) to 83 percent (+/- 2 percent) of the maximum dry density per modified Proctor test (ASTM D1557), or as directed by the Geotechnical Engineer. Determination of in-place density shall be made using a nuclear gauge per ASTM D6938. Moisture content determination shall be conducted on a soil sample taken at the location of the nuclear gage reading per ASTM D2216.

Grade BSM to a smooth, uniform surface plane with loose, uniformly fine texture. Rake, remove ridges, and fill depressions to meet finish grades.

Final soil depth shall be measured and verified only after the soil has been compacted. If after consolidation, the soil is not within +/- 3/4 inch of the grades and slopes specified on the Plans, add material to bring it up to final grade and raked.

The BSM shall be inspected and accepted for placement and finish grade by the

Engineer/Landscape Architect prior to the installation of planting and mulch. Any BSM that does not conform to this Specification shall be remediated to the satisfaction of the Engineer/Landscape Architect, or removed and replaced with acceptable BSM, at the Contractor's expense.

4.04 PLANTING AND MULCHING

Bioretention facilities shall be planted and mulched as shown on the Plans.

Bioretention facilities shall not be planted or mulched when soils are excessively wet as defined in Section 2.07.

Bioretention facility areas contaminated by sediment laden runoff prior to planting or placement of mulch shall be remediated at the Contractor's expense by removing the contaminated BSM (top 3 inches minimum) and replacing with BSM to the lines and grades on the Plans.

All mulch shall be inspected and accepted by the Engineer to ensure appropriate depth and material prior to facility commissioning (e.g., unblocking of inlets).

4.05 FLOOD TESTING

Inlets shall be constructed per the Plans and free from all obstructions prior to commencing flow testing.

Testing shall be conducted at the conclusion of the 60-day plant grow-in period. Protection and flow diversion measures shall be removed in their entirety prior to commencing flow testing.

Underdrains shall be plugged at the outlet structure to minimize water consumption during testing.

Prior to testing, broom sweep gutter and other impervious surfaces within the test area to remove sediments and other objectionable materials.

The Engineer shall be present during the demonstration. The Contractor shall notify the Engineer a minimum of 2 working days prior to testing.

The Contractor shall water test each facility to demonstrate that all inlet curb openings are capturing and diverting all water in the gutter to the facility, outlet structures are engaging at the elevation specified, and the designed ponding depth is achieved. Testing shall include application of water from a hydrant or water truck at a minimum rate of 10 gallons per minute, into the gutter a minimum of 15 feet upstream of the inlet curb opening being tested. Each inlet shall be tested individually. If erosion occurs during testing, restore soils, plants, and other affected materials.

Engineer or Landscape Architect will identify deficiencies and required corrections, including but not limited to relocating misplaced plants, adjusting streambed gravel, adjusting mulch, adjusting inlets, splash aprons, and forebays, removing and replacing inlets, and removing debris.

Once adjustments are made, the Contractor shall re-test to confirm all test water flows into the facility from the gutter and correct any remaining deficiencies identified by Engineer.

Inlets, outlets, and other bioretention facility appurtenances shall not be accepted until testing and any required correction and retesting is complete and accepted by the Engineer.

END OF SECTION 115

SECTION 116

INTER-AGENCY CONTACT INFORMATION

WEB SITES, ADDRESSES, AND TELEPHONE NUMBERS

Web Sites, Addresses, and Telephone Numbers

Reference or agency or	Web site	Address	Telephone no.
American Water Enterprises	www.amwater.com	2415 UNIVERSITY AVE., EAST PALO ALTO, CA 94303	(650) 325 6195
California Department of Industrial Relations	www.dir.ca.gov	455 GOLDEN GATE AVENUE SAN FRANCISCO CA 94102	--
CalTrans, Traffic Operations, California Manual of Uniform Traffic Control Devices	http://www.dot.ca.gov/ trafficops/camutcd/		
CalTrans, 2018 Standard Plans and	http://dot.ca.gov/des/ oe/construction- contract-		
East Palo Alto Sanitary District	www.epasd.com	901 WEEKS STREET EAST PALO ALTO , CA 94303	(650) 325-9021
Menlo Park Fire Protection District			
Palo Alto Park Mutual Water Company	www.papmwc.org	2190 Addison Avenue, East Palo Alto, CA 94303	(650) 322-6903
City of East Palo Public Works Engineering	http://www.ci.east	PW-ENGINEERING DIVISION 1960 TATE ST., EAST PALO ALTO, CA 94303	(650) 853-3189
Underground Service Alert	www.usanorth.org		811 (800) 227-2600

END OF SECTION 116

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SECTION 117

PLANTING

PART 1 – GENERAL

1.1 SCOPE

A. Furnish and install all container plantings, groundcover, mulch, staking, and related work thereto.

B. Related work specified elsewhere:

1. Landscape Soil Preparation - Section 119
2. Landscape Maintenance - Section 120

1.2 REFERENCES

A. Interpretations of plant names and descriptions shall reference the following documents. Where the names or plant descriptions disagree between the several documents, the most current document shall prevail.

1. USDA – The Germplasm Resources Information Network (GRIN) http://www.ars-grin.gov/npgs/searchgrin.html
2. Manual of Woody Landscape Plants; Michael Dirr; Stipes Publishing, Champaign, Illinois; most current edition.
3. New Sunset Western Garden Book, Oxmoor House, most current edition.

B. ANSI American Standard for Nursery Stock

C. Federal, State, and County laws requiring inspection for plant disease and insect control.

1.3 QUALITY CONTROL

A. Reviews: The Contractor shall specifically request the following reviews prior to progressing with the work:

1. Plant material approval
2. Finish grade
3. Substantial completion
4. Final completion

1.4 SUBMITTALS

A. Plant Material: Within 30 days after award of contract, Contractor shall submit notice to the City's Representative certifying the quantity and species of plant material ordered, the nursery supplying the material, any plant material unavailable at the time, and proposed plant substitutions. No plants shall be ordered or delivered prior to written acceptance by the City's Representative.

B. Mulch: Name of supplier and one quart-sized sample.

C. Certificates: All plant materials shall meet the specifications of Federal, State, and County laws requiring inspection for plant diseases and insect infestations. Inspection certificates required by law shall accompany each shipment, invoice, or order of stock, and when such plants arrive at the site of work, the certificate of inspection shall be filed with the City's Representative.

PART 2 – MATERIALS & EQUIPMENT

2.1 MATERIALS

A. Nomenclature and Labels: Plant botanical names shall conform to current literature noted in section 1.2. All plants of each clone, species, and cultivar shall be delivered to the site labeled with their full botanical names. Every plant species shall be labeled with no less than one label for every ten plants of a species.

B. Quality: Minimum quality of all plant material shall conform to prevailing published specifications of the California Association of Nurserymen and the American Association of Nurserymen's American Standard for Nursery Stock unless otherwise indicated. Additional specifications shall be indicated on the drawings.

C. Quantities: The quantities shown on the plant list and in labels are for the City Representative's use and are not to be construed as the complete and accurate limits of the contract. Contractor shall furnish and install all plants shown schematically on the drawings. Any unlabeled plants shall be considered as the smaller size shown for that type on the drawings.

D. Root Systems: All container-grown stock shall be grown in its container for at least six months prior to its planting. Contractor shall allow one percent of the quantity of plants for removal and inspection. Any plant material, within one year following the final acceptance of the project, determined by the City's Representative to be defective, restricted, declining or otherwise deficient due to abnormal root growth, shall be replaced by Contractor to the equal condition of adjacent plants at the time of replacement.

E. Trees: All trees shall have straight trunks of uniform taper, larger at the bottom. Trunks shall be free of girdling roots or damaged bark, with all minor abrasions and cuts showing healing tissue. Sucker basal growth and sucker lateral growth shall be removed and treated to eliminate re-sprouting. Normal lower side branching shall remain. Trees unable to stand upright without support shall be rejected.

F. Health: Foliage, roots and stems of all plants shall be of vigorous health and normal habit of growth for its species. All plants shall be free of all diseases, insect stages, burns, or disfiguring characteristics.

G. Untrue Species: All plant material, within two years following the final acceptance of the project, determined by the City's Representative to be untrue to the species, clone, and/or variety specified, shall be replaced by the Contractor, to the equal condition of adjacent plants at the time of replacement.

H. Mulch: Mulch shall be Wonder Mulch, available from Vision Recycling (831) 479-7857.

PART 3 – EXECUTION

3.1 GENERAL

A. Plant Material Approvals: Before planting operations commence, all or a representative sampling of plant material shall be reviewed at the site by the City's Representative. Defective

plants installed without such review shall be removed from the site upon request by the City's Representative and an acceptable plant substituted in its place.

B. Storage and Handling:
Plant materials shall be protected and maintained in good condition. Bare root and balled materials shall be watered regularly and placed in a cool area. Plant material shall be protected at all times from animal damage, vandalism, drought damage, wind damage, frost damage, toxic irrigation water, or any other condition that would damage or reduce the viability of the plants. Plants shall be kept moist at all times and shall be completely watered twelve (12) hours or less before planting and shall be moist when installed.

C. Layout: Only those plants to be planted in any single day shall be laid out. Locations of all plants shall be reviewed prior to planting. Plants installed without this review shall be transplanted as directed by the City's Representative.

D. Protection of Plants: Contractor shall maintain all plant material in a healthy growing condition prior to and during planting operations. Contractor shall be responsible for vandalism, theft and damage to plant material until the commencement of the maintenance period.

E. Root Systems: Contractor shall be responsible for inspection of all root systems on plant materials. Inspection shall include, but not be limited to, checking for rootbound stock, encircling roots at the perimeter of the container, evidence of girdling roots, and other defective root conditions. Such inspections shall include the complete removal of soil from one percent of plant material containers, or at least one plant from each nursery and each plant type. Contractor shall cut defective or potentially defective girdling, rootbound, and encircling roots and spread the root system into the surrounding backfill. Plants with excessively defective root systems shall be rejected by the Contractor.

F. Pruning: Contractor shall do no pruning without the specific approval of the City's Representative. Plants pruned without approval shall be replaced by the Contractor, if required.

G. Basins: Construct basins as necessary to water plants. Remove basins from all plants under a permanent irrigation system prior to final inspection and finish grade the planting area. Basins for plants to be hand-watered shall remain in place. Basin bottoms shall drain to berm away from plant stem.

H. *Staking: All trees shall be staked as drawn with stakes driven securely into existing soil aligned with the trunk and perpendicular to the direction of the prevailing winds. A minimum of two figure-eight rubber tree ties required per stake.*

I. Plant Pits, Backfill and Finish Grading: See Soil Preparation Section 31 92 13 for materials and installation requirements.

J. Cleanup: After completion of all operations, Contractor shall remove all trash, excess soil and other debris. All walks and pavement shall be swept and washed clean, leaving the entire area in a neat, orderly condition.

PART 4 – MEASUREMENT & PAYMENT

Included in Section 100 of these Technical Specifications.

END OF SECTION 117

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SECTION 118

PLANTING IRRIGATION

PART 1 – GENERAL

1.1 SCOPE

A. Work in this section includes installation of a complete automatic irrigation system, including excavation for points of connection, trenching, piping, equipment, electrical components and incidentals related thereto.

B. Related work specified elsewhere:
   1. Landscape Soil Preparation - Section 119

1.2 QUALITY CONTROL

A. Standards: Unless otherwise shown or specified, all materials and methods shall conform to section 20-2 of the State of California Department of Transportation Standard Specifications (DTSS) as they reasonably apply to this work except for measurement and payment requirements.

B. Reviews: Contractor shall specifically request the following reviews prior to progressing with the work:
   1. Layout of system.
   2. Points-of-connection excavation.
   3. Trenching and pipe assembly.
   4. Coverage adjustment of all drip emitter lines, bubbler heads and valve box installation.
   5. Operation of system.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Quality: All materials shall be new and the best quality available unless otherwise specified. All materials shall be clearly marked by manufacturer on all material, containers, or certificates of contents for inspection.

B. Plastic Pipe and Fittings: All mainline pipe ¾” – 1-½” in size shall be polyvinyl chloride (PVC) Schedule 40; sizes 2” and larger shall be Class 315. Unless otherwise noted, all laterals shall be Class 40 PVC pipe; solvent weld fittings, if used, shall be Schedule 40, or Schedule 80 as called for on details. Solvent for piping shall be as recommended by manufacturer. All pipe shall be clearly labeled with manufacturer type and specification numbers.

C. Copper Pipe: Hard-drawn copper piping, type "K".

D. Control Wire: Type UF, 600 v. insulation, minimum size #14, copper, common to be white, valve control wire to be red or black, U.L. approved for irrigation control use; splices shall be "Scotch-Lok" seal pack, or equal.

E. Valve Boxes: Precast concrete or plastic of type and size indicated; free of all cracks, chips or structural defects. Boxes located in pavement (asphalt or concrete) and/or subject to vehicular traffic shall be concrete and have heavy duty steel covers. Boxes shall be sized to provide a 4” minimum clearance around the irrigation equipment inside the box, excluding all pipes and fittings.

F. Irrigation Equipment: Refer to drawings. Any desired substitutions require submittals in duplicate for specific written approval.

G. Thread Sealant: Permatex Thread Sealant, part #14H, white in color.

H. Valve ID Tags: All control valves to be labeled with standard yellow valve ID tags, available from Ewing Irrigation, (650)592-9530, or similar.

PART 3 – EXECUTION

3.1 GRADING: Contractor shall be responsible for installing all irrigation features to their finished grade and at depths indicated. All rough grading shall be completed before trenching commences.

3.2 LAYOUT AND TRENCHING: All features of the irrigation system shall be staked and pipe alignments marked prior to trenching for review by the City's Representative.

3.3 BACKFILLING: Do not cover joints until system has been reviewed by the City's Representative. Backfill with damaging rocks and debris shall not be permitted. Compact all backfill and eliminate settlement. Previously prepared soil is to be replaced as the top six inches of backfill.

3.4 FABRICATION: Snake pipe from side to side when trench exceeds thirty feet in length. All manifolds shall be neat, orderly, and constructed for ease in maintenance operations. Construct manifolds to allow valve boxes to be parallel to each other and to adjacent walls, walks, curbs, and buildings. Cuts and joints shall be free of burrs, smooth, and minimum in quantity. All pipe above finish grade shall be galvanized unless noted otherwise.

3.5 PIPELINES: All pipelines shown parallel on the drawing may be installed in a common trench. Where pipelines are shown parallel or adjacent to shrub or groundcover areas, they shall be installed in these areas. All changes in depth of pipe shall be accomplished using 45-degree fittings.

3.6 TESTING: Test mainline at 125 psi for six (6) hours. Test and repair as necessary until satisfactory test conditions are obtained.

3.7 CONTROL WIRE: Install control wire in pipe trenches wherever practical. Tape to underside of pipe every ten feet. Loop wire every 20 feet. Splices shall occur in valve boxes only and shall be accomplished utilizing approved connectors. All wire shall be installed below or level with the bottom of adjacent pipes. All wiring above finish grade shall be enclosed in steel conduit. Splices shall be installed in junction boxes.

3.8 ADJUSTMENTS: Adjust all heads for arc, radius, riser height, and distribution for uniform and optimum coverage. Such adjustments shall include nozzle changes without additional cost to *city.*

3.9 FINISH GRADE: Unless otherwise noted, all heads shall be set at finish grade and on double or triple swing joints as called for on drawings. The top of all valve boxes shall be flush with finish grade.

3.10 CONTROLLER: Contractor shall clearly label and sequence stations for ease in maintenance operations. Station valves to operate as they are located around the site. Fasten controller and wire conduits securely to wall with conduit clamps and screws. Contractor shall complete all forms and labels shipped with and/or attached to the controller; attach his own name, address and phone number to the controller via a permanent label; and shall properly execute and file with city the controller and valve guarantees.

3.11 EQUIPMENT PAD

A. Domestic and Irrigation Backflow concrete footings shall be per plans and Section 32 13

13 Concrete Paving.

B. Controller concrete enclosure pad shall be per plans and Section 32 13 13 Concrete Paving.

3.12 IRRIGATION SYSTEM AUDIT: Contractor shall coordinate and provide assistance to a third-party certified irrigation auditor to complete the irrigation audit. The Contractor shall schedule the audits once the irrigation system is in operation. Provide a two-week (14 day) notice for scheduling the audit. Contractor shall anticipate providing staff to assist auditor during the process, allow up to 2 hours at site.

3.13 RECORD DRAWING: Contractor shall regularly update a print of the system and any changes made to the system throughout the project. Features below ground shall be indicated with at least two measurements from surface features such as walks, building, or sprinkler heads. All changes shall be recorded on this plan before trenches are backfilled. The record drawing shall be completed and submitted to city before final payment shall be made for work installed.

PART 4 – MEASUREMENT & PAYMENT

Included in Section 100 of these Technical Specifications.

END OF SECTION 118

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SECTION 119

LANDSCAPING SOIL PREPARATION

PART 1 – GENERAL

1.1 SCOPE

A. Furnish and install all landscape soil preparation as shown and specified, including, but not necessarily limited to, the following: organic amendment, fertilizer, and finish grading.

B. Related work specified elsewhere:
   1. Planting - Section 32 93 00

1.2 QUALITY CONTROL

A. Reviews: Contractor shall specifically request at least two working days in advance of the following reviews prior to progressing with the work:
   1. Completion of rough grading
   2. Verification of amendment incorporation depths
   3. Finish grade

B. Certification: Written certificates stating quantity, type, and composition, weight and origin for all amendments and chemicals shall be delivered to the City's Representative before the material is used on the site.

C. Soil Testing: None required under these specifications.

D. Amendment Samples: None required under these specifications.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Biotreatment Soil Mix: Refer to Section 115 Bioretention Planting

PART 3– PRODUCTS

3.1 LIMITS AND GRADES

A. Grade Review: Prior to commencing soil preparation operations, Contractor shall request a review by the City's Representative to verify specified limits and grades of work completed to date and soil preparation work to commence. Contractor shall complete the rough grading as necessary to round the top and toe of all slopes, providing naturalized contouring to integrate newly graded areas with the natural topography. Finish grading under this section shall be completed in accordance with the grades indicated on the drawings.

3.2 BIOTREATMENT SOIL MIX PLACEMENT

A. Refer to Section 115 Bioretention Planting

3.3 PLANT PITS

A. Plant Pit Preparation: Plant pits shall have their sides and bottoms loosened or otherwise broken to prevent glazed or compacted surfaces, and shall be as shown on the planting detail.

3.4 BACKFILL

A. Backfill Material and Placement: Only unamended soil shall be used beneath the root ball; cultivate bottom of plant pit to improve porosity. Backfill around sides of rootball shall be the amended soil taken from adjacent prepared areas. Spread material excavated from plant pits onto adjacent areas as replacement.

3.5 PLANT PACKETS

A. Packet Quantities: All container plants shall receive plant packets as follows:

one-gallon plants	one 10-gram packets
five-gallon plants	two 10-gram packets
fifteen-gallon plants	nine 10-gram packets
24 inch box trees	sixteen 10-gram packets
36 inch box trees	twenty-four 10-gram packets

Space the packets evenly around the root ball in backfill, 6-8 inches from soil surface, 1 inch away from root ball. Owner's/City's/County's Representative may require excavation of up to 5% of all plants selected at random for conformance review.

3.6 FINISH GRADING

A. Grading Operations: Contractor shall finish grade all irrigated planting areas unless otherwise noted, and shall remove all rocks and clods over one cubic inch to a depth of one inch below finish grade. All areas shall be smooth and uniformly graded. All erosion damage during the construction period shall be repaired by the Contractor.

B. Finish Grades: Unless otherwise noted, all soil finish grades shall be one inch below finish grade of walks, pavements, and curbs.

PART 4 – MEASUREMENT & PAYMENT

Included in Section 100 of these Technical Specifications.

END OF SECTION 119

SECTION 120

LANDSCAPING MAINTENANCE

PART 1 – GENERAL

1.1 SCOPE

A. Work in this section includes the growing and maintenance operations necessary to establish the newly planted shrubs, trees, and other plantings; to provide insect and disease control, and to maintain the irrigation system, and related construction elements.

B. Related work specified elsewhere:
1. Planting Irrigation - Section 118
2. Landscape Soil Preparation – Section 119
3. Planting - Section 117

1.2 SUBMITTALS

A. Soil Testing: Contractor shall collect one one-quart sample in the container planting areas of the in-place bioretention soil 20 days after completion of planting and submit to Waypoint Analytical, Inc. of Anaheim, (714)282-8777, for maintenance period fertilizer recommendation. Contractor shall request recommendations for fertilization of California Native Plants. Test results shall be made available to the City's Representative. Sample shall be a representative composite taken from several planting areas. Cost of soil test shall be paid for by the Contractor.

B. Herbicide/Fungicide/Insecticide: Submit a written recommendation from a State of California appropriately licensed individual along with complete product data from proposed manufacturer, for review by City Inspector and/or City's appropriately licensed individual.

1.03 SCHEDULE

A. Work in this section will not begin until the irrigation audit is complete. Refer to drawings for irrigation audit information.

B. Maintenance and Warranty period shall be for a minimum period of ninety (90) calendar days after pre-final inspection.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Fertilizer: Used during the course of the maintenance period shall be determined by soils test required under Part 1 of this Section. For bidding purposes only, assume the use of ammonium sulfate (21-0-0) at 5 lbs. per 1000 SF, minimum of two applications.

B. Water: During the course of construction and maintenance period water shall be paid for by the Contractor.

C. Herbicide/Fungicide/Insecticide: Shall be a commercially available chemical recommended for this project and these plantings by a State of California appropriately licensed individual. The licensed individual shall review all planting, including but not limited to seed, sod, groundcovers, shrubs, and trees, the types and extent of soil preparation, the irrigation systems, drainage patterns, and other project characteristics to verify type, compatibility, and recommend the

appropriate chemical(s) for use. Contractor shall be responsible for all overspray, spreading, runoff, plant health, and other impacts from the use of the chemical(s).

D. Animal Control Materials: None required under these specifications.

PART 3 – EXECUTION

3.1 TIME LIMITS: The maintenance period shall commence from the date of substantial completion of planting as defined in paragraph 3.6 below, and extend for a ninety (90) day period thereafter, or until the acceptance of Final Completion.

3.2 FERTILIZER APPLICATION: Fertilizer(s) shall be applied per Waypoint Analytical, Inc. recommendations. For bidding purposes, assume initial application to be four weeks after planting and subsequent applications to be at 45-day intervals.

3.3 HERBICIDE APPLICATION: Herbicide shall not be used until all plant material has been planted a minimum of 20-days. All planting areas shall be kept weed-free by non-herbicide methods during this time period. Herbicide shall not be applied to any areas that are or have been seeded. Contractor must apply the material in conformance with the written recommendations of the State appropriately licensed individual.

3.4 BASIC REQUIREMENTS: All planting areas shall be kept weed-free at all times during the maintenance period. All pest and disease control shall be the Contractor's responsibility. All planting areas shall be kept at optimum moisture for plant growth. Settlement of soil and plants and soil erosion shall be repaired and areas replanted as required. Dying or deficient plants shall be replaced as soon as they become apparent.

3.5 CITY'S RESPONSIBILITY: Work installed under this contract that is damaged or stolen prior to Substantial Completion shall be repaired or replaced by the Contractor without cost to the City. After Substantial Completion and through the maintenance period, these damages and similar factors such as extensive litter, abuse and defacement shall be the City's responsibility to repair or replace and shall not be a part of this contract. No planting shall be guaranteed beyond the maintenance period, except as to conformance to specified species and variety, and except as to conditions specified under "Root Systems" of Planting, Section 32 93 00.

3.6 SUBSTANTIAL COMPLETION: Shall be deemed as the time all major plantings, including groundcover, are installed, and when all other work is satisfactorily completed (with the exception of minor items to be completed as noted upon a checklist compiled by the City's Representative). Maintenance period shall not commence until work is deemed substantially complete by the City's Representative.

3.7 FINAL REVIEW: Contractor shall request a final review of the project at least five days in advance of the proposed date. Failure to request this notice shall automatically extend the date of completion. The maintenance period will continue until project is deemed complete.

PART 4 – MEASUREMENT & PAYMENT

Included in Section 100 of these Technical Specifications.

END OF SECTION 120

END OF TECHNICAL SPECIFICATIONS