

City of Livermore's

Bridge Preventive Maintenance Program And Bridge Prioritization Procedure

By Mallika Ramachandran, P.E., Assistant City Engineer

In September 2022, staff submitted a Bridge Preventive Maintenance Program (BPMP) plan for 32 out of City of Livermore's 34 bridges to Caltrans for review and approval for funding under the Federal Highway Administration (FHWA) grant program. In December 2022, the city's BPMP plan was approved by Caltrans' District 4 Highway Bridge Program (HBP) manager, and it was submitted to Caltrans's Headquarters for approval and for listing in the Federal Transportation Improvement Program (FTIP).

The amount of federal grant requested was approximately \$8.9M. The federal share is 88.53% (approximately \$7.9M) and the local share is 11.47% (approximately \$1M). Potential funding sources for the match funds include SB1, TIF, Gas Tax, etc. Once the city's BPMP is approved for inclusion in the FTIP, the federal funds will be available for city to submit the request for funding obligation after September 2023.

The intent of the FHWA Bridge Preventive Maintenance Program (BPMP) is to keep bridges in structurally good condition to maximize their service life and to conserve limited funds available for bridges that do require major rehabilitation or replacement. The city submitted 32 bridges for work identified in the Caltrans bridge inspection reports, such as expansion joint replacement, concrete deck seals and overlays, abutment and wingwall concrete crack repairs, slope scour protection, corrosion protection, etc. Staff also completed independent field inspections between July and September 2022 to develop the detailed scope of work, quantities and cost estimate and verify Caltrans' work recommendations and note any additional work that may be required.

The purpose of this Bridge Inspection and Preventive Maintenance Program (BPMP) is to allow the city to utilize a planned strategy of cost-effective treatments to keep bridges and bridge elements in good condition, delay future deterioration and avoid large expenses in bridge reconstruction or replacement.

The BPMP objectives include:

1. Maintain the existing inventory of bridges in good or fair condition rating.
2. Correct minor structural deficiencies early in a bridge's life, before a bridge has problems requiring costly rehabilitation, reconstruction, or replacement.
3. Extend the service life of existing bridges.
4. Make efficient use of limited resources for maximum benefit.

The grant program required the city to develop a Bridge Preventive Maintenance Program and a Bridge Prioritization Procedure. The Bridge Prioritization Procedure for the BPMP is based on the following point (pts) allocations, and an example is shown in a Table 1 - Bridge Prioritization Checklist below:

- A. Caltrans work recommendations: Yes, work was recommended in the Caltrans inspection report – 5 pts, No – 0 pts
- B. Bridge does not qualify for rehabilitation or replacement: Yes, the bridge does not require major rehabilitation or replacement (Bridges eligible for rehabilitation or replacement are rated SD or FO and have a sufficiency rating of 80 or less) – 5 pts, No – 0 pts
- C. BPMP type of repairs ranked high to low:

1. Structural elements and safety repairs: deck surface, approach slab, railings, bearing pad, expansion joints, bridge barriers, bridge fence, bridge scour, abutment or foundation, embankment erosion control and slope protection, painting of structural elements with Paint Condition Index (PCI) >65, Corrosion Protection (Cathodic Protection) etc. – 20 pts, No – 0 pts
2. Repairs to improve driving surface and safety: deck and approach road spalls, cracks and potholes, etc. – 10 pts, No – 0 pts
3. Flood mitigation: debris removal from channel – 5 pts, No – 0 pts
4. Visibility obstructions mitigation: vegetation trimming – 5 pts, No – 0 pts
5. Location of the bridge: does the bridge have redundancy or is it located in a dead-end road or on a road with long detours, high Average Daily Traffic (ADT) and serves high number of residents, identified evacuation routes, etc. – Yes 10 pts, No – 0 pts
6. Site visit and inspection identified other issues such as damaged curb, gutter, sidewalk, catch basin, utility boxes; attachment to utility pipes on side of bridge or under the bridge is failing; broken signage post or inadequate signage; fading pavement striping or markers, etc. - Yes 5, No – 0 pts

D. Other considerations for selection and prioritization of bridges for repairs:

- a. Grouping of similar repair work type: Deck methacrylate treatment, Concrete Polyester and Asphalt Concrete overlay; Joint Seal replacement, etc.

See attached Table 2 - Bridge Preventive Maintenance Program - Bridge Prioritization for a list of bridges submitted for the grant.

**TABLE 1 - BRIDGE PRIORITIZATION CHECKLIST
(EXAMPLE)**

CATEGORY	BRIDGE NO. 1	BRIDGE NO. 2	BRIDGE NO. 3	BRIDGE NO. 4
A. Caltrans work recommendations: Yes – 10 pts, No – 0 pts	10	10	10	0
B. Bridge does not qualify for rehabilitation or replacement: Yes – 5 pts or No – 0 pts (Bridges eligible for rehabilitation or replacement are rated SD or FO and have a sufficiency rating of 80 or less)	5	5	5	0
C. BPMP type of repairs ranked high to low:				
1. Structural elements and safety repairs: deck surface, approach slab, railings, bearing pad, expansion joints, bridge barriers, bridge fence, bridge scour, abutment or foundation, embankment erosion control and slope protection, painting of structural elements with PCI >65, Corrosion Protection (Cathodic Protection)etc. – 20 pts, No – 0 pts	20	20	0	0
2. Repairs to improve driving surface and safety: deck and approach road spalls, cracks and potholes, etc. – 10 pts, No – 0 pts	5	0	10	10
3. Flood mitigation: debris removal from channel – 5 pts, No – 0 pts	0	5	0	0
4. Visibility obstructions mitigation: vegetation trimming – 5 pts, No – 0 pts	0	5	0	0
5. Location of the bridge: does the bridge have redundancy or is it located in a dead end road or on a road with long detours, high Average Daily Traffic (ADT) and high number of residents served, etc. – 10 pts, No – 0 pts	0	10	0	10
6. 6. Site visit and inspection identified other issues such as damaged curb, gutter, sidewalk, catch basin, utility boxes; attachment to utility pipes on side of bridge or under the bridge is failing; broken signage post or inadequate signage; fading pavement striping or markers, etc. - Yes 5, No - 0	5	0	0	5
TOTAL POINTS (70 pts)	45	55	25	25
PRIORITY RANK FOR BPMP	2	1	3	4
Evaluate For Highway Bridge Program (HBP) Replacement Or Rehabilitation				YES
Feasibility of Implementation: Any known implementation or coordination issues; other projects in the area, requires extensive public outreach and coordination; funding or resource constraints, etc.				

- E. The city's BPMP Plan that was submitted to Caltrans, followed Caltrans' BPMP Plan guidelines noted below:

Project Prioritization

Local Agencies must develop objective procedures to prioritize their preventive maintenance projects. These procedures must be included in the project files for review in future audits. High priority projects should include the repair of scour countermeasure, embankment erosion control and the repair, restoration, and strengthening of structural elements.

Priority should be given to bridges that are not eligible for rehabilitation or replacement under the Federal Highway Bridge Program. The intent of the program is to keep these bridges in structurally good condition to maximize their service life and to conserve limited funds available for bridges that do require major rehabilitation or replacement. (Bridges eligible for rehabilitation or replacement are rated SD or FO and have a sufficiency rating of 80 or less.)

Deadlines:

Local agency transmits the BPMP with cover letter certifying compliance with these program guidelines. The electronic copy (any spreadsheet format) should be included with the paper transmittal letter. The Caltrans District Local assistant Engineer's (DLAE's) must receive the BPMPs by September 30th for funds to be obligated in the next Federal Fiscal Year (FFY) year, and January 30th of each year for adjustments. No time extensions will be granted.

Accountability:

Local Agencies are responsible for understanding and complying with the program requirements defined in the "Bridge Preventive Maintenance Program Guidelines For Local Agencies."

**City of Livermore's
TABLE 2 - Bridge Preventive Maintenance Program - Bridge Prioritization
By Mallika Ramachandran, P.E.**

Total Eligible Bridges (City owned or maintained)	34													
Total Bridges Requesting BPMP Funds	32													

City of Livermore 2022 BPMP Plan

Priority (Lowest Number Is Top Priority)	Agency Location	Bridge Number from Inspection Report	Facility Carried	Feature Intersected	Location	Sufficiency Rating	Structural Deficient (SD)/Functionally Obsolete (FO) Status	Work Description	Deck Area (ft ²)	Unit Cost (\$/ft ²)	Federal Share	Local Share	Total Particip. Cost
1								Development of the Bridge Preventive Maintenance Program Plan for Future FY			\$ 26,559	\$ 3,441	\$ 30,000
2	ALA	33C0070	Stanley Blvd	Arroyo Mocho	0.1 MI West of Murrieta Blvd	86.1	Not SD	1-Repair MBGR on N.E. corner 2-Fix undermined gutter/sidewalk @ S.E. corner 3-Cut Eucalyptus tree rotating N.W. Wingwall 4-Patch concrete spall/exposed rebar on W. Abut. 5-Remove debris/veg in channel	11284	\$ 118	\$ 1,177,449	\$ 152,551	\$ 1,330,000
3	ALA	33C0129	South Vasco Road	Arroyo Seco	0.1 MI North of East Avenue	64.9	Not SD	1-Remove asphalt crack sealant, treat bridge deck, restripe 2-Repair settled AC approaches 3-Remove debris/veg in channel	2340	\$ 282	\$ 584,298	\$ 75,702	\$ 660,000
4	ALA	33C0423	Vallecitos Road	Arroyo Del Valle	450' Northwest of Vineyard Road	61.2	FO	1-Treat bridge deck & restripe 2-Add rock slope scour protection 3-Remove debris/vegetation in channel 4-Repair concrete spalls 5-Repair guardrail	7781	\$ 86	\$ 593,151	\$ 76,849	\$ 670,000
5	ALA	33C0414	Laughlin Road	Altamont Creek	0.1 KM North of Foxtail Drive	95.5	Not SD	1-Treat bridge deck & restripe 2-Repair unsound concrete areas in wingwalls 3-Remove debris/vegetation in channel	1629	\$ 153	\$ 221,325	\$ 28,675	\$ 250,000
6	ALA	33C0425	First Street	Union Pacific Railroad	150' South of Scott Street	94	Not SD	1-Treat bridge deck & restripe 2-Add joint in center median at BB/EB 3-Add slope paving at both abutments due to erosion 3-Fix undermined gutter/sidewalks	15077	\$ 22	\$ 292,149	\$ 37,851	\$ 330,000
7	ALA	33C0395	West Jack London Blvd.	Arroyo Las Positas	0.5 MI East of El Charro Road	89.9	Not SD	1-Treat bridge deck & restripe 2-Replace joint seals 3-Paint bridge identification	4432	\$ 20	\$ 79,677	\$ 10,323	\$ 90,000
8	ALA	33 0408R	Airway Blvd NB	Interstate 580	04-ALA-580-14.95-LVMR	69.4	Not SD	1-Repair 20 feet of damaged MBGR on the right of Abutment 1. 2-Install the access soffit opening cover in Span 1 3-Remove and replace cracked and undermined sidewalks at BB/EB 4-Repaint bridge information on barrier	20279	\$ 11	\$ 203,619	\$ 26,381	\$ 230,000
9	ALA	33C0195	Arroyo Road	Arroyo Mocho	0.2 MI South of College Avenue	96	Not SD	1-Remove asphalt crack sealant, treat bridge deck, & restripe 2-Repair S.W. spalled concrete barrier	9898	\$ 10	\$ 88,530	\$ 11,470	\$ 100,000
10	ALA	33C0426	Holmes Street	Arroyo Mocho	500' North of Mocho Street	83	Not SD	1-Slurry seal AC deck surface and restripe 2-Repaint bridge information 3-Seal concrete cracks in Abut with epoxy 4-Fix undermined at gutter/sidewalk	8221	\$ 130	\$ 947,271	\$ 122,729	\$ 1,070,000
11	ALA	33C0711	Stanley Blvd	Isabel Avenue (SR84)	1 MI West of Murrieta Blvd	N/A	N/A	1-Treat bridge deck & restripe 2-Add joint in center median at BB/EB 3-Reinstall soffit access opening covers	17280	\$ 8	\$ 123,942	\$ 16,058	\$ 140,000
12	ALA	33C0389	First Street	Interstate 580	.3 MI North of Las Positas Rd	N/A	N/A	1-Treat bridge deck & restripe 2-Replace joint seals 3-Repair concrete bridge deck spalls 4-Reconstruct center medial with joint at BB/EB 5-Repair settled/cracked sidewalk	25575	\$ 11	\$ 239,031	\$ 30,969	\$ 270,000
13	ALA	33C0397	Springtown Blvd	Altamont Creek	1 MI N of I-580	86.1	Not SD	1-Provide corrosion protection for the steel arch near the waterline. 2-Repair concrete crack/spall on W. Barrier at N. end.	8553	\$ 5	\$ 35,412	\$ 4,588	\$ 40,000
14	ALA	33C0385	South Vasco Road	Union Pacific Railroad	0.9 MI South of I-580	85.9	SD	1-Treat bridge deck & restripe 2-Replace joint seals/headers 3-Repair settled/cracked sidewalk	18811	\$ 15	\$ 256,737	\$ 33,263	\$ 290,000
15	ALA	33 0408L	Airway Blvd SB	Interstate 580	04-ALA-580-14.95-LVMR	N/A	N/A	1-Repaint bridge information on barrier 2-Treat bridge deck and restripe	16285	\$ 9	\$ 132,795	\$ 17,205	\$ 150,000

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16	ALA	33C0192	Bluebell Road	Altamont Creek	1.3 MI North of I-580	77.7	Not SD	1-Slurry seal AC deck surface & restripe 2-Paint timber railings 3-Repair large concrete spalls on soffits, replace corroded reinf.	2546	\$ 102	\$ 230,178	\$ 29,822	\$ 260,000
17	ALA	33C0194	Charlotte Way	Arroyo Seco	0.3 MI North of East Avenue	84.6	Not SD	1-Treat bridge deck & restripe 2-Repair spalled concrete on sidewalk @ Abut 1	2687	\$ 19	\$ 44,265	\$ 5,735	\$ 50,000
18	ALA	33C0450R	Union Pacific Railroad	Greenville Road	0.2 MI South of National Dr	N/A	N/A	1-Fix cracks in wingwalls with epoxy injection 2-Tighten cables in railings	3642	\$ 5	\$ 17,706	\$ 2,294	\$ 20,000
19	ALA	33C0491	Union Pacific Railroad	Greenville Road	0.2 MI South of National Dr	N/A	N/A	1-Fix cracks in wingwalls with epoxy injection 2-Tighten cables in railings	3642	\$ 5	\$ 17,706	\$ 2,294	\$ 20,000
20	ALA	33C0382	Las Positas Road	Arroyo Seco	0.3 MI East of First Street	95.8	Not SD	1-Slurry seal AC deck surface and restripe 2-Remove debris/veg in channel	3947	\$ 147	\$ 513,474	\$ 66,526	\$ 580,000
21	ALA	33C0193	Broadmoor Street	Altamont Creek	North Skiff Road	88.9	Not SD	1-Repair large concrete spill on S. Abutment 2-Remove debris/veg in channel	1808	\$ 122	\$ 194,766	\$ 25,234	\$ 220,000
22	ALA	33C0198	Airway Blvd	Arroyo Las Positas	0.1 MI S/O I-580	72.3	Not SD	1-Slurry seal AC deck surface and restripe 2-Replace sloped concrete paving on N.E. corner 3-Tighten MBGR cable 4-Remove debris/veg in channel	7679	\$ 53	\$ 362,973	\$ 47,027	\$ 410,000
23	ALA	33C0416	North Mines Road	Union Pacific Railroad	0.5 KM South of State RTE 8	98.8	Not SD	1-Treat bridge deck & restripe 2-Repair concrete spalls	19747	\$ 11	\$ 185,913	\$ 24,087	\$ 210,000
24	ALA	33C0424	First Street	Arroyo Seco	600' NW Las Positas Road	95.2	Not SD	1-Treat bridge deck and restripe	8893	\$ 8	\$ 61,971	\$ 8,029	\$ 70,000
25	ALA	33C0413	Patterson Pass Road	Flood Control Channel	0.4 KM East of Vasco Road	97.4	Not SD	1-Remove debris/vegetation in channel	2909	\$ 96	\$ 247,884	\$ 32,116	\$ 280,000
26	ALA	33C0383	Arroyo Vista Road	Arroyo Seco	500' West of Las Positas Road	96.9	Not SD	1-Slurry seal AC deck surface and restripe 2-Remove debris/veg in channel	3782	\$ 145	\$ 486,915	\$ 63,085	\$ 550,000
27	ALA	33C0381	Patterson Pass Road	Arroyo Seco	500' East of Mulqueeney Street	96.5	Not SD	1-Slurry seal AC deck surface and restripe	3663	\$ 14	\$ 44,265	\$ 5,735	\$ 50,000
28	ALA	33C0380	Charlotte Way	Arroyo Seco	300' West of Lucille Street	96.5	Not SD	1-Slurry seal AC deck surface and restripe 2-Repair spalled concrete locations	1792	\$ 28	\$ 44,265	\$ 5,735	\$ 50,000
29	ALA	33C0379	Lucille Street	Arroyo Seco	200' S Charlotte Way	89.4	Not SD	1-Slurry seal AC deck surface and restripe	1332	\$ 23	\$ 26,559	\$ 3,441	\$ 30,000
30	ALA	33C0196	Union Pacific Railroad	P Street	0.1 MI North of Railroad Avenue	N/A	N/A	1-Repair concrete spalled areas on substructure	7758	\$ 1	\$ 8,853	\$ 1,147	\$ 10,000
31	ALA	33C0197	Union Pacific Railroad	Livermore Avenue	0.1 MI North of Railroad Avenue	N/A	N/A	1-Repair concrete spalled areas on substructure	5320	\$ 2	\$ 8,853	\$ 1,147	\$ 10,000
32	ALA	33C0191	Bluebell Road	Altamont Creek Tributary	1.1 mi North of I-580	91.8	Not SD	1-Install chainlink fence/railing on top of bridge barriers 2-Remove debris/veg in channel	3920	\$ 97	\$ 336,414	\$ 43,586	\$ 380,000
33	ALA	33C0386	Union Pacific Railroad	Murrieta Blvd	0.1 MI North of Stanley Blvd	N/A	N/A	1-Repair spalled concrete areas 2-Reconstruct chain link fence railing 3-Install vertical clearance signs	2920	\$ 14	\$ 35,412	\$ 4,588	\$ 40,000

Two bridges not included in the BPMP:
33C0415 Southfront Rd at Arroyo Seco SR 94, Not SD
33C0485 Concannon Blvd at Arroyo Mocho SR 82, Not SD

Total Request \$ 8,890,000