MARYSVILLE HISTORIC COMMERCIAL DISTRICT

Historic Structure Impact Report

Prepared for
HDR, Inc.

Prepared by
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Innovating Tradition

TABLE OF CONTENTS

FIGURES

A. EXECUTIVE SUMMARY

A variety of reports, studies, and theoretical projections of the impacts of construction-related vibrations on buildings are available for consideration when analyzing potential project impacts. Using the Caltrans *Transportation- and Construction-Induced Vibration Guidance Manual* and other previously prepared MRL reports and analyses, Garavaglia Architecture, Inc. finds that the anticipated vibrations projections of 0.05 – 0.13 in/sec PPV as measured at the building foundations, are within the industry thresholds for vibrations limits near historic or fragile structures. This anticipated PPV is also below the level generally required to cause aesthetic or structural harm to historic or fragile buildings. Therefore, there is very low probability for aesthetic or structural damage to either the Bok Kai Temple or nearby contributors to the Marysville Downtown Historic District. Using a conservative approach, Garavaglia Architecture, Inc. recommends that the lower vibration threshold presented by Caltrans of 0.08 in/sec PPV be used as the vibrations threshold for the MRL Phase 2b project. This represents the maximum recommended vibration as measured by monitoring equipment. Recommended placement of monitors averages approximately 90-100-feet from construction depending on building foundation locations and property access privileges.

A.1 RECOMMENDATIONS

A.1.1 Pre-Construction

Establishing Baseline Vibrations Conditions
Ambient vibrations conditions should be collected immediately prior to the start of construction. This should be compared to the empirical construction-related data gathered at the Phase 1 construction-site (0.01 – 0.04 in/sec typically) and the anticipated vibrations from construction along Phase 2b (0.05 – 0.13 in/sec). If ambient vibrations exceed the actual and anticipated construction-related vibrations level, the likelihood of damage from future construction is quite low. If ambient vibrations are lower than anticipated construction-related vibrations, greater sensitivity to changing building conditions, such as increased cracking, mortar loss, dislodged units, or changes to vertical tilt may be warranted.

Establishing Baseline Building Conditions
Understanding the difference between current conditions and those anticipated during and after construction is critical for sensitive historic resources like those contributing buildings to the National Register listed, Marysville Historic Commercial District along the south side of First Street. Therefore, a solid understanding of baseline conditions, with supporting documentation for reference, is recommend. Specific recommended actions include:

- 3D laser scans or photogrammetry
  Data gathering is relatively fast (1-2 days at most) and cost effective. Processing of the data may be contingent on the need. If no changes are observed and no construction-related vibrations events exceed the recommended thresholds, it may not be necessary to process and analyze the point-cloud information gathered on-site. This could be a cost savings.

- Systematic recordation with high resolution digital photographs
  As an alternate to laser scanning, thorough recordation of all surfaces with a digital camera can be used to establish a visible baseline of conditions. This method requires 1-2 days in the field and has minimal processing time. It is not as accurate as laser scanning, but is highly superior to regular photographic documentation.

- Installation of crack monitors
  Inexpensive and effective, crack monitors can be installed in sensitive locations with no impact on the historic resource and very little visual impact for tenants and building owners. They will require regular on-site monitoring.

Public Outreach & Education
Anticipated vibrations levels are quite low, but they are within the range detectible by humans. Therefore, education of the public is highly recommended. This is especially important because access to private property will be necessary if vibrations monitors are installed as recommended. Specific recommendations include:

- Public notification letters to residents, owners, and business proprietors within 200-feet of the construction zone, and along all proposed haul routes.

- Public meetings with dissemination of any presentations, questions, and answers following each meeting.

- Dissemination of educational materials concerning specific steps owners or tenants can take to limit incidental impacts such as falling objects or dislodging of poorly mounted materials on walls, ceilings, or shelving.

Stabilizing 226 First Street and the building behind 226 First Street
226 First Street currently has front and rear walls that are not plumb or square, and appear to be separating from the rest of the structure. A free-standing brick wall with an unsupported masonry parapet pose risks to pedestrians on the sidewalk as well as to construction crews at the proposed staging area immediately east of the building.

226 First Street should be stabilized through the following actions:

- *Front facade*
  The front facade needs to be anchored back into the roofline with all-thread rod or cable through the masonry with a positive attachment to the existing roof framing.

- *Rear wall parapet*
  The rear wall needs to be anchored into the roofline with all-thread rod or cable through the masonry with a positive attachment to the existing main roof framing.

The masonry shell at the rear of 226 First Street is also in very poor condition and is semi-collapsed. To prevent further damage, the following stabilization method is recommended:

- *Accessory building walls*

Each of the four freestanding walls of this building should be braced through installation of a single standard tilt-up panel at each wall with all panels anchored to a central concrete deadman.

A.1.2 During Construction

The following steps to monitor the historic resource for changes during construction are recommended:

Implementation of a Vibrations Monitoring Plan

- Install a minimum of 5 monitoring units at the rear (south) foundations walls of the buildings along First Street. One should be located outside the temple, within the rear section of the property at 7 D Street. A second unit is recommended at the rear wall of 312 First Street. A third should be placed at the southwest corner of 232 First Street. A fourth should be placed at the southeast corner of 226 First Street. A fifth unit should be installed inside the building shell at the rear of the 226 First Street property. These locations will require owner's permission and may pose and access issues.

- Select a qualified monitoring professional with certified equipment and trained personnel.

- Equipment should allow for remote monitoring and should generate immediate notification to responsible parties when the recommended vibrations threshold of 0.08 in/sec has been exceeded.

- Cease all construction within 200-feet of the monitor recording the vibrations spike when the threshold has been exceeded and visually inspect the subject buildings within the APE for damage.

- Establish a regular maintenance and monitoring schedule to collect data and check equipment.

Out of Plane Monitoring
Biaxial tilt monitors should be installed on the 226 First Street property to detect movement of the stabilized walls. One monitor should be placed at the top of the front wall at the northwest corner of the building. For the rear building, monitors should be placed at the top corners of each elevation. A total of nine (9) monitors are recommended.

Regular Field Inspections
Regular, quick visual inspections of the subject buildings are recommended. This is a quick visual survey of focused areas where the most sensitive historical resources are located. A standard methodology, perhaps a checklist, should be developed to guide these inspections and provide for consistency across the project's duration. Inspections should occur weekly, at the beginning or end of the construction shift, on a regular schedule. In addition, inspections should be made when monitors detect PPV readings above 0.08 in/sec, when the tilt monitors detect movement of 1-degree or more, or when crack monitors show movement of 1/32-inch (0.5 mm) or more.

Dust & Debris Control

Barriers to prevent debris from striking the building should be put in place prior to the start of construction. In addition, a dust mitigation plan should be created to limit dissemination of airborne particles into interior spaces of the properties on First Street.

A1.3 Post-Construction

Affirming Building Conditions
Understanding the difference between pre-construction conditions and those existing after construction is critical for sensitive historic resources like those contributing buildings to the National Register listed, Marysville Historic Commercial District along the south side of First Street. Therefore, a comparison of conditions, with supporting documentation for reference is recommend.

- 3D laser scans or photogrammetry
  Any differences in the information would indicate deterioration that has occurred since the start of construction. A determination of the causes of the damage, and whether it is the result of natural occurrences or of construction activities would then be necessary. This may not be necessary for every building but would be recommended as a way to document conditions in case there is any disputed damage in the future.

- Systematic recordation with high resolution digital photographs
  This can be applied as an alternate to laser scanning. Both methods are not required.

A.1.4 Mitigations

While no construction-related impacts are anticipated as a result of the projected vibrations levels, certain mitigation measures may be necessary if conditions worsen at any of the subject buildings. Proposed mitigations range from temporary solutions to brace walls, to permanent solutions that improve the overall stability of the buildings.

Masonry Repointing
Replacement mortar should match the original to the greatest degree possible. A proper mortar mix can be determined through testing samples of the exiting mortar according to the provisions of ASTM 1324. Once a proper mix is determined, the walls should be pointed by a skilled mason who is familiar with working with archaic masonry construction.

Unit Replacement
If units become dislodged, construction within 200-feet of the affected building should stop immediately. An assessment of the causes of falling material should be made immediately to determine if the incident was an individual occurrence or if it is part of a larger eminent failure. Once the causes for dislodging are determined and mitigated, replacement of the unit should be made with mortar that is compatible with the historic materials. Units should be of similar size, coloring, and strength, and should have similar surface textures and characteristics as surrounding units.
Wall Bracing
If walls, wall sections, or parapets begin to tilt out-of-plane, all construction within 200-feet of the affected building should stop and the walls should be braced immediately. Small areas and parapets can be addressed with temporary bracing. Larger areas of damage will require further assessment to determine an appropriate repair.

A.2 SUMMARY

There are very few anticipated impacts on the Marysville Historic Commercial District as a result of construction-related vibrations. Vibration will occur at levels detectable by humans but should remain well below the levels generally required to cause aesthetic damage. Structural damage is highly unlikely based on the current analysis. Provided limited pre-construction stabilization measures are implemented, vibrations levels remain under the recommended threshold of 0.08 in/sec, and the project is properly monitored to verify that levels remain below this threshold, impacts to the historic district are highly unlikely.

1. INTRODUCTION

The city of Marysville is located approximately 50 miles north of Sacramento, California in Yuba County. Marysville is surrounded by 7.5 miles of levee that protect it from the flooding of three water courses: the Yuba River to the south; Jack Slough to the north; and the Feather River to the west. These levees vary in height from 16 to 28 feet.

The Yuba River drains out of New Bullards Bar Dam in the Sierra Nevada and runs along the south edge of the Marysville Ring Levee project (MRL) into the Feather River. Jack Slough runs a quarter mile northwest of the MRL and flows into the Feather River. The Feather River drains from Oroville Dam and Reservoir from the north along the western edge of the Maryville Ring Levee and then flows into the Sacramento River.

MRL is a cooperative effort between the United States Army Corps of Engineers (Corps), the State of California Central Valley Flood Protection Board (CVFPB), and the Marysville Levee District (District) to protect the City of Marysville from a 200-year flood event.[1]

Garavaglia Architecture, Inc. has been contracted to assess the potential impacts of proposed levee improvements on two National Register-listed historic resources immediately adjacent to, but located outside of, the project Area of Potential Effect (APE, see Figure 1): the Bok Kai Temple (temple) and the Marysville Historic Commercial District (district). The temple property is currently encroached upon by the north side of the levee. The district is non-contiguous and approximately three blocks of the National Register district are immediately adjacent to the APE. The Bok Kai Temple is addressed in a separate Historic Structure Impact Report, also completed by Garavaglia Architecture, Inc.

1.1 MRL PROJECT SUMMARY

As authorized under the United States Army Corps of Engineers (USACE) IDIQ Contract No. W91238-10-D-0003, Delivery Order No. 0009, revised June 15, 2011, HDR/Fugro WLA Joint Venture (JV) was tasked with preparation of the Alternative Analysis for the Marysville Ring Levee Phase 2B (MRL) and the geophysical and pothole exploration of levee penetrations and encroachments, in support of levee improvement and reconstruction. The entire Marysville ring levee consists of approximately 7.5 miles of the levee surrounding and protecting the City of Marysville, California. Planned levee improvement measures throughout the ring levee address underseepage, through-seepage, embankment slope stability, utility penetrations, constructability, settlement, and geometrical corrections to the levee embankment. The MRL Engineering Documentation Report (EDR) and the MRL Environmental Assessment (EA) addresses the engineering and environmental aspects, respectively, of the Phase 1 through 4 levee improvements for the entire Marysville area flood protection system. The Geotechnical Appendix of the MRL EDR identifies Phase 2 as a critical reach requiring levee improvements. In particular, the reach from Stations 244+00 to 285+00, Phase 2B was identified as a critical reach due to past performance and past repairs as well as its close proximity to historic structures. Additionally, penetrations and encroachments in the levee embankment and foundations dating to the mid 19th century have abandoned underground construction with

[1] "Memorandum of Agreement Between the U.S. Army Corps of Engineers and the California State Historic Preservation Officer, Regarding the Marysville Ring Levee Project, Yuba County, California," (March 2011), 1.

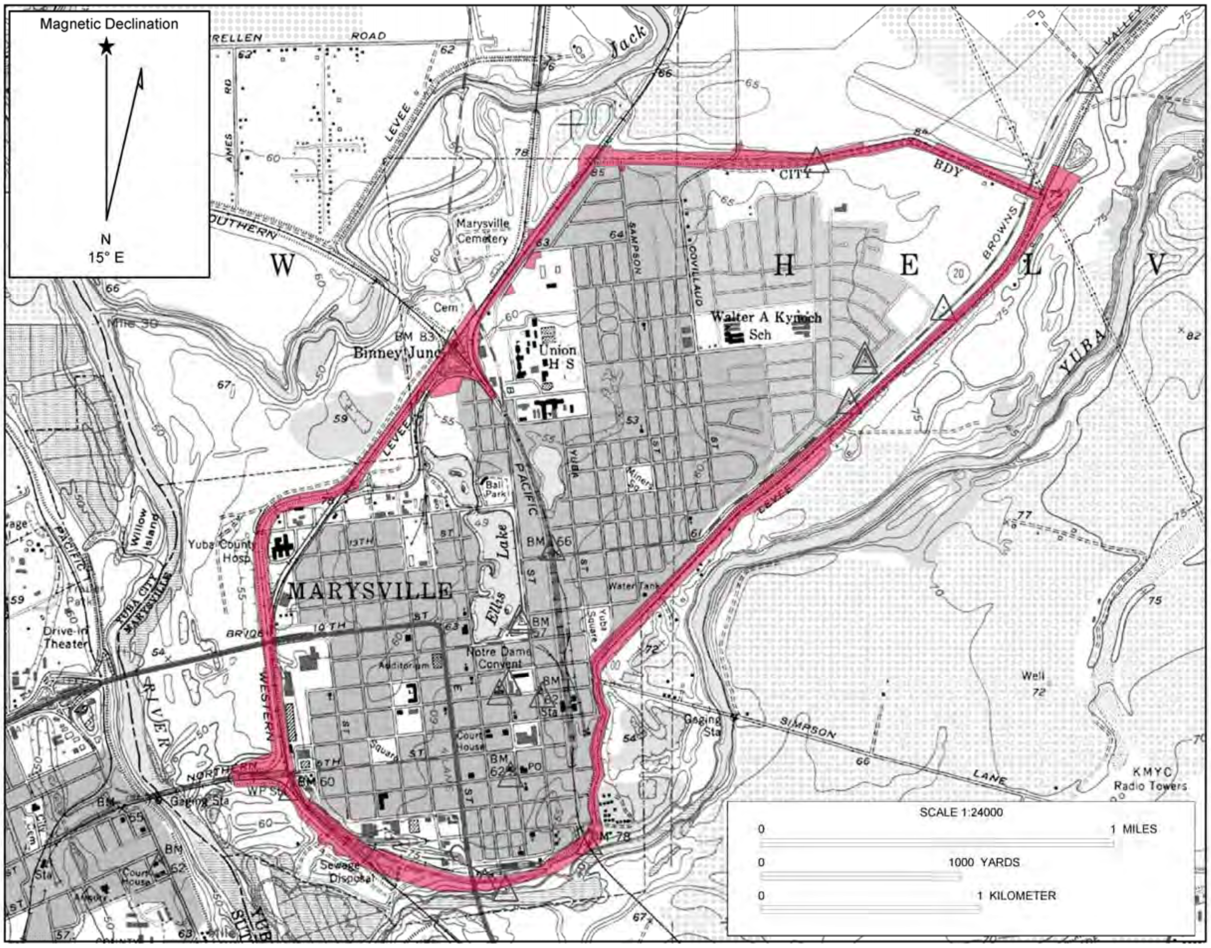

Figure 1. The project APE. The APE follows the physical extent of the levee around Marysville. Areas of anticipated staging are also included where the APE extends beyond the immediate levee confines.[2]

potential voids that may cause instability and/or seepage. The USACE engineer's opinion is that this site may have serious defects due to these conditions and requires through and underseepage mitigation. The MRL Phase 2B project was divided into three segments for the alternative analysis: Segments K1, K2 and L1.

The mitigation measures considered for the MRL Phase 2B project are levee degradation/reconstruction and cutoff wall construction. Levee degradation/reconstruction involves degrading (removal) of the existing levee and reconstructing a new levee. The cutoff wall measure involves degrading approximately the top half of the levee, constructing a cutoff wall to the necessary depth and reconstructing the top portion of the levee. Both mitigation measures only involve standard earthmoving equipment.

[2] *Memorandum of Agreement Between the U.S. Army Corps of Engineers and the California State Historic Preservation Officer, Regarding the Marysville Ring Levee Project, Yuba County, California*, March 2011, Attachment A.

The through-seepage mitigation measures considered in Segment K1 are levee degradation/ reconstruction and a cutoff wall. Only one alignment option was considered (existing alignment). This is the segment in closest proximity to the Bok Kai Temple.

The underseepage and through-seepage mitigation measures considered in Segment K2 only included a cutoff wall. There are two alignment options considered (existing alignment and slightly modified alignment). The cutoff wall in this segment will be slightly deeper for underseepage mitigation. This is the segment in closest proximity to historic district contributing buildings in poor condition.

The through-seepage mitigation measures considered in Segment L1 are levee degradation/ reconstruction and a cutoff wall. There are four alignment options under consideration (existing alignment, slightly modified alignment, and two set forward alignments). For the existing and slightly modified alignments, levee degradation/reconstruction and cutoff wall mitigation measures are considered, similar to Segment K1. Similar to Segment K2, cutoff wall mitigation measures are assumed for the set forward alignments located approximately 100 feet to 300 feet east of the existing levee. Segment L1 is not located near any identified historic resources.

Phase 2B consists of several construction techniques used in combination to install a 50- to 90-foot deep, cutoff wall through much of the length. In addition, jet grouting would occur at the four bridges in this section (5th Street Bridge, Highway 70 Bridge, two railroad bridges). Construction in the Phase 2B portion must consider impacts on the historic resources as well as treatment of existing utilities with through-levee placements. All work associated with Phase 2B is projected to use conventional construction equipment such as loaders, scrapers, graders, and excavators.[3]

The following descriptions represent the extent of construction methods anticipated.

1.1.1 Cutoff Wall Construction

The levee crown would be degraded down 4- to 12-feet to provide a 40- to 50-foot temporary work surface for construction equipment. Conventional cutoff walls are constructed using an excavator with a long-stick boom capable of digging a trench to a maximum depth of approximately 75 to 80 feet. Some excavators can reach depths of up to 90 feet. The trench width will vary depending on depth, but it is assumed for this report the minimum width would be 36 inches (3 feet). A bentonite slurry is placed in the trench as it is excavated to prevent caving while the backfill material is mixed. The excavated soil is mixed with the appropriate slurry (either bentonite or cement-bentonite) to achieve the required cutoff wall strength and permeability, and then backfilled into the trench. The levee portion that was degraded is now reconstructed. All work is completed with standard earthmoving equipment.

1.1.2 Levee Reconstruction

Instead of degrading only a portion of the levee as above, with Levee Reconstruction the levee is completely degraded. In some cases, a cutoff wall described above is installed at the location of the new levee alignment. In these areas, a working platform would be constructed above the existing ground surface for construction of the cutoff wall. After levee degrading and cutoff

[3] United States Army Corps of Engineers, "*Final, Marysville Ring Levee, Yuba River Basin, California, Environmental Assessment, Initial Study*," (April 2010), 10.

wall installation, the levee is reconstructed. All work is completed with standard earthmoving equipment.

1.2 HISTORIC PRESERVATION OBJECTIVES AND REQUIREMENTS

1.2.1 Section 106

The preparation of this *Historic Structure Impact Report* is part of the mandated adherence to Section 106 review, 36 CFR Part 800, as amended in August 2004. Section 106 requires that federal agencies, and entities that they fund or license, consider the effects of their actions on properties that are listed in the National Register of Historic Places (NRHP), or that may be eligible for such listing. To determine whether an undertaking could affect NRHP-eligible properties, cultural resources, including archaeological, historical, and architectural properties, must be inventoried and evaluated. Although compliance with Section 106 is the responsibility of the lead federal agency, others can conduct the work necessary to comply. Additionally, because both the Downtown Marysville Commercial District and the Bok Kai Temple are National Register listed historic resources, it is a statutory requirement under Section 110(f) of the National Historic Preservation Act (NHPA) that the agency official (Corps and CVFPB), to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm resulting from an undertaking.

In compliance with Section 106 of the NHPA, the Corps entered into a Memorandum of Agreement (MOA) with the California Department of Parks and Recreation Office of Historic Preservation (SHPO) regarding treatment of both the Bok Kai Temple and Marysville Commercial Historic District during this project.

The NHPA defines an effect as an alteration to the characteristics of a historic property that qualify it for inclusion in or eligibility for the National Register of Historic Places (NRHP). Effects can be found adverse or not adverse. Adverse effects are defined by the *Criteria of Adverse Effect* as outlined in 36 CFR 800.5(a)(1). An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify that property for inclusion in the NRHP in a manner that would diminish the integrity of that property's location, design, setting, materials, workmanship, feeling, or association. In applying the criteria of adverse effect, regulations require that consideration be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the NRHP. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative. Examples of adverse effects on historic properties include, but are not limited to:

1. Physical destruction of, or damage to, all or part of the property;

2. Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties and applicable guidelines;

3. Removal of the property from its historic location;

4. Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;

5. Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features;

6. Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and

7. Transfer, lease, or sale of property out of Federal ownership or control or conditions to ensure long-term preservation of the property's historic significance.[4]

1.2.2 CEQA

The California Environmental Quality Act (CEQA) (Section 15064.5) requires the lead CEQA agency to assess the impacts of the project on cultural resources. For the MRL, the lead CEQA agency is the lead non-Federal agency, CVFPB.[5] Historical resources are defined as "any object, building, structure, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California."[6] Before the level of significance of impacts can be determined and appropriate mitigation measures developed, the significance of historical resources must be determined. Generally, the application of Section 106 is considered to adequately address the requirements of CEQA.

This report is intended to provide information to related to compliance with both Section 106 and CEQA for the MRL Phase 2B project.

1.3 OVERVIEW OF PREVIOUS STUDIES

In preparation for this project, a number of previous studies have been conducted related to the potential construction methods under consideration, site specific qualities such as soil and levee condition, identification of known and potential historic resources in the area, and possible impacts related to levee repairs. The conclusions in each report are consistent and form the basis for many of the conclusions and recommendations in this document. The following presents the most relevant project-related studies and their findings.

- Roger Zemba, *Memorandum for Record: Structural Observations and Analysis for Historic Structures – Marysville Ring Levee Construction*, 13 January 2010

  This memo is included as Attachment A of the 14 January 2010 memo by Erik James. It briefly describes the condition of the Temple, as observed in October 2009, as good and structurally sound. Recent repairs were noted, including replacement of the tile roof with wood singles and replacement of the two supporting porch columns. The memo highlights the existence of a sheet pile wall approximately half-way between the Temple

[4] "Code of Federal Regulations, Section 36, Part 800: Protection of Historic Properties, Subpart B, Section 800.5(2)(i-vii)," (Washington, D.C., 2004).
[5] Initial Study, 117.
[6] California Public Resources Code, Section 5020.1(j).

and the proposed construction location. The author states that the construction methods used to install the existing sheet pile wall are much more impactful and likely to have caused damage than the methods proposed for the MRL project. Also, the MRL project would be nearly twice as far away as the existing sheet pile wall, further reducing the likelihood of construction-related adverse impacts to the Temple. It concludes that if construction methods were carefully selected, no impacts were likely to the Bok Kai Temple.

- Erik James, *Memorandum for Record: Marysville Ring Levee EDR – Bok Kai Temple Construction Impact Evaluation*, 14 January 2010

  This memo summarizes the findings of the earlier January 13, 2012 memo and adds calculations of anticipated vibrations based on methodology from Caltrans *Transportation- and Construction-Induced Vibrations Guidance Manual*. They used a conservative distance of 40-feet between the Temple and proposed construction activities and values associated with heavy impact construction equipment such as pile drilling equipment and large bulldozers (0.089 in/sec PPV). Even with site-specific soils data, they used a more conservative *n*-value of 1.1 to provide as conservative an estimate as possible for consideration. Their result was an anticipated peak particle velocity from construction equipment (PPV) of 0.05 in/sec.

  The memo concludes that level of anticipated vibration is below recognized thresholds where damage to buildings in good repair (like the Temple) is unlikely. It recommends a number of measures to limit construction-related vibrations as well as monitoring of the historic resource during construction.

- HDR, Inc., *Engineering Documentation Report, Marysville Ring Levee, Yuba River Basin, California*, April 12, 2010

  The MRL is part of the larger Yuba River Basin project. As such it is covered under the environmental review documents produced for that project. Modifications to the MRL required creation of a separate document to verify that the conditions outlined in the original Environmental Impact Statement (EIS) remain valid. The report concluded that the MRL project is consistent with the original project review. The original NEPA determination of a Finding of No Significant Impact and CEQA findings justifying a Negative Declaration remain valid.

- *Environmental Assessment/Initial Study, Marysville Ring Levee, Yuba River Basin, California*, April 2010

  This document concluded with a finding of No Significant Impact (NEPA) and supported a Negative Declaration (CEQA) for the Marysville Ring Levee improvements. It discussed a number of potential and known historic resources, including the Bok Kai Temple and the Downtown Marysville Commercial District. Drawing primarily from the two January 2010 memos referenced above, it concluded the project was unlikely to result in impacts to these historic resource and recommended additional study and monitoring.

- HDR/Fugro/WLA, *Geotechnical Data Report, Marysville Ring Levee, Phase 2B, Marysville, California*, December 7, 2012

  This survey established areas of previous intrusions or voids in the levee as well as summarizing the known geologic history and categorization of soils in the Marysville area. Previous intrusions include a sheet pile wall near the Bok Kai Temple. The top of the wall will be located four-feet below the ground surface.

- HDR/Fugro/WLA, *Final Alternatives Analysis, Marysville Ring Levee Phase 2B, Yuba River Basin, California*, July 2012

  The major problems with the Phase 2B levee segments are identified as through-seepage and underseepage during high water events. Three possible solutions were deemed viable for the three segments: shallow cutoff wall, deep cutoff walls, and levee reconstruction. Four different possible alignments were also considered. The result was eight different alternatives presented in the report ranging in cost from approximately $11 million to $17 million.

1.4 IMPACT REPORT GOALS AND METHODOLOGY

The goal of this historic structure impact report is to analyze potential impacts of the proposed project and project alternatives on the historic resource. Based on that analysis, recommendations to mitigate any potential impacts have been developed. The bulk of this analysis centers on evaluation of the possible vibrations resulting form proposed construction and comparison of these anticipated values with the body of literature concerned with establishing construction-related vibrations thresholds for historic buildings. This report is the second of a two-phase evaluation process that was preceded by a *Marysville Levee Preliminary Historic Resource Impacts* memo dated July 19, 2012.

1.4.1 Literature Review

Garavaglia Architecture, Inc. reviewed relevant project and historical information including:

- Donald Napoli, *Downtown Marysville Commercial Historic District National Register Nomination* (1999)

  The nomination established the boundaries of the historic district as well as the character defining features of the district. The period of significance includes both 19th and 20th century building campaigns but stops prior to the redevelopment efforts of more recent decades. It provides a historical context for Marysville in general, and minimal contextual information on the Chinese community that established the Bok Kai Temple and occupied the buildings on First Street, closest to the MRL project.

- California Department of Transportation, *Transportation- and Construction-Induced Vibration Guidance Manual* (2004)

  This document serves as the basis for evaluation of vibrations-related impacts on buildings in various states of repair and construction types. It presents formulas for evaluation of site-specific conditions and recommends vibrations thresholds for construction-related activities. While it is not the only vibrations guideline referenced in this report, it is the only one specifically mentioned in the scope of work for the MRL project.

- *Memorandum of Agreement between the U.S. Army Corps of Engineers and the California State Historic Preservation Officer, Regarding the Marysville Ring Levee Project, Yuba County, California* (2011)

  The MOA establishes documentation and methodology requirements regarding the historic resources near the APE for the MRL project. It represents the agreement between the major stakeholders and serves as the overarching guideline for this document.

1.4.2 Field Investigations

After review of relevant background information, a site visit was conducted on December 7, 2011 to inspect the interior and exterior of the Bok Kai Temple for existing conditions, and to conduct a general exterior survey of buildings in the historic district within 200 feet of the MRL project. This site visit included Architectural Conservator and Historian, Becky Urbano (Garavaglia Architecture, Inc.), Structural Engineer, Steve Duquette (Duquette Engineering), and HDR team member and vibrations expert, Dr. Sandy Figuers (Norfleet Consultants). A second site visit was conducted on August 30, 2012 to observe and note interior conditions of the buildings on the south side of First Street. This memo is the result of observations made during those site tours as informed by the background project information and ongoing conversations with HDR, the Corps, and other team members.

2. HISTORICAL CONTEXT AND SIGNIFICANCE

2.1 HISTORY

"The Marysville Historic Commercial District represents the development of commerce in the city from the mid-nineteenth century to just after the end of the Second World War. The district provides the city's only sizable collection of commercial buildings constructed before 1948. It has strong links to early retail business as well as later commercial development."[7] This large area is split into two sections, with a total of fifty-nine contributing buildings, one contributing structure, and twenty-six non-contributing buildings when the district was nominated to the National Register in 1998. It represents the traditional commercial and governmental heart of the City and contains a number of mixed-use (commercial and residential, retail and office, etc.) buildings. Over 100 years of construction types, design, and retail trends are represented as well.

The following contextual information is quoted from portions of the Significance and Description sections from the district nomination form and from the *Bok Kai Temple Historic Structure Report*. Please see the original documents for more information.

2.1.1 The Founding of Marysville

> The city of Marysville lies at the confluence of the Yuba and Feather Rivers in Yuba County on a portion of land granted to John Sutter by the Mexican rulers of California in 1841. Sutter leased part of his land to Theodor Cordua, who built a rancho on the north bank of the Yuba River, just east of its junction with the Feather River, and raised livestock in the surrounding area. This was the beginning of the settlement that would soon become Marysville. In 1848, Cordua sold a half interest in the land to a former employee of his, Charles Covillaud, and later sold his remaining interest to Michael Nye and William Foster. Covillaud's partners in the land grant soon changed so that by 1849 four men, Covillaud, Jose Manuel Ramirez, John Simpson, and Theodore Sicard had become Covillaud and Company. In 1850, town lots were mapped out, parcels sold, and the name of Marysville chosen for the new town in honor of Mary Murphy, the wife of Charles Covillaud and a survivor of the infamous Donner Party. Marysville was incorporated as a town by the California Legislature in 1851.[8]

2.1.2 Gold Rush Era

> Marysville's early history is directly linked to the discovery and exploitation of gold in the nearby foothills of the Sierra Nevada Mountains. Following the discovery of gold at Sutter's lumber mill in Coloma in January 1848, Marysville's potential as a point of transfer for goods, people, and riches was quickly realized. The position of Marysville at the meeting of two navigable rivers, and its relative proximity to San Francisco, Sacramento, and the gold

[7] Donald Napoli, *National Register of Historic Places Nomination: Marysville Historic Commercial District, (*1999), 8.
[8] Architectural Resources Group, "Bok Kai Temple Historic Structure Report, " September 2002, 13.

fields, made the site well suited to take advantage of the Gold Rush economy. Although gold discoveries were made just a few miles from the town, most of the early growth of Marysville was based on the related industries of trade, transportation, and financing, not directly on mining enterprises."[9]

… As strikes were made in the northern foothills, miners sailed up the Feather and Yuba Rivers to reach the gold fields…. Other merchants moved quickly to exploit Marysville's advantageous location. By 1850 the town had become the main supply point for thousands of miners upriver in the foothills. Several dozen businesses operated from canvas tents and other impermanent structures along the Yuba River. The permanent population reached about 500.

Marysville and its commercial district grew rapidly in the 1850s. The town became the Yuba County seat in 1850 and incorporated in 1851. The population grew steadily, reaching around 4,000 by the end of the decade. Businesses grew in number and diversity. Many, from banks and blacksmiths to clothiers and saloons, appealed to miners. Capital investment increased too. Spurred by one flood and several major fires, businessmen replaced tents and other flimsy structures with larger buildings made of brick. Local kilns were kept busy, as nearly 140 brick commercial buildings went up between 1851 and 1855. The business district expanded north from the waterfront. Many local miners were immigrants from China, who sought goods and services from fellow countrymen. Part of the commercial district became their center for supplies and temporary housing. The permanent Chinese population in town rose to around 1,000 by the end of the decade. Marysville became *Sam Fou*, the third most important city for Chinese in California. Mixed use typified buildings throughout the district. Retail stores occupied the first story and residences the second.[10]

2.1.3 Post-Gold Rush Development (1860 – 1900)

The district did not grow much in the next four decades. The commercial zone stayed south of Fourth Street, even when floods and fires required buildings to be replaced. The last and most serious flood, in 1875, prompted the construction of a levee that closed off most of the district from the Yuba River. The Central Pacific Railroad arrived in the 1860s, establishing a link that slowly diverted traffic from the river. The district's clientele changed. Gold became less accessible to miners, forcing many of them to leave the area. Agriculture, on the other hand, enjoyed steady growth. More land opened to cultivation, prices rose, and the number of local farmers increased. Wheat became the most popular and profitable crop. The town grew in size and changed somewhat in character, with women and children replacing single men. Marysville's population reached 4,700 in 1870, making it the eighth largest city in the state. The number of residents then slowly declined through the end of the century. The commercial district diversified, offering a wide range of goods and services in more than 200 separate businesses. Chinese establishments, mostly in the southeast quadrant of the district, maintained their own clientele but shared in the prosperity. Three

[9] Ibid.
[10] District National Register Nomination, Section 8, 36-41.

benevolent associations (tongs) helped to place workers and settle business disputes. When in the 1880s anti-Chinese sentiments led to violence elsewhere, Marysville became a refuge for displaced Chinese workers. In the 1890s the local economic situation worsened as the international wheat market collapsed, the nation went into a depression, and many Chinese left the country in response to discriminatory state and federal laws.[11]

2.1.4 Agricultural Influences (1900 – 1930)

More than other factors, changes in agriculture after the turn of the century generated new wealth in Marysville and surrounding areas. The district expanded dramatically. Irrigation was the key. Canals from local rivers made possible the cultivation of irrigated crops on small farms. Wheat ranchers subdivided their holdings into 20- to 40-acre parcels, which new settlers planted in a variety of crops, especially fruit orchards. Farm income shot up. Marysville, the main trading center for the revivified agricultural region, became the Hub City. Two new railroads, the Western Pacific and the Northern Electric, which had arrived around 1910, provided alternative shipping channels…Local industry expanded. The district's stores stocked everything for the local consumer, from cars and farm implements to clothes and groceries. The town's population, reversing its previous slide, jumped 65 percent between 1900 and 1930.

In the eyes of Marysville's business and civic leaders, business expansion faced only one serious obstacle. Most commercial buildings suffered from obsolescence. Dating from the 1850s, many were small and dilapidated. They hardly fit with the modern, up-to-date city that Marysville was becoming. Building owners, often living elsewhere, showed no interest in making changes. The result was a major construction boom, primarily on the blocks between Fourth and Sixth Streets. Some twenty buildings, valued at well over a million dollars, went up during the 1920s. Many others underwent substantial renovations. Two buildings in particular represent this era of expansion and optimism. The Hart Building, designed for offices, rose seven stories and became what was probably the tallest commercial structure between Sacramento and Portland. The five-story Hotel Marysville, financed by a group of local businessmen, offered travelers accommodations as elegant as those found in any small city in California.[12]

2.1.5 The Great Depression and Military Influences (1930 – 1960)

The Great Depression of the 1930s brought an end to prosperous times. As in much of California, downtown businesses in Marysville limped along, providing service to their regular customers but not expanding their operations. Agricultural income plummeted, but gold dredging continued to keep Yuba County among the state's top gold producers and cushioned the worst effects of the depression. The town's population increased by about 15 percent during the 1930s, but it was not enough to generate new construction until the end of the

[11] Ibid.
[12] Ibid.

decade. The Second World War, especially the opening of the huge Camp Beale just south of the river, revived the economy. Downtown continued resurgence in the years directly after the war, as pent-up consumer demand kept business humming. A few new buildings went up, and several more were modernized.

Commercial activity in the district maintained its postwar level into the 1960s. But it did not attract new customers, many of whom lived miles from downtown and relied on automobiles for all their travel. Business shifted to stores with adjacent parking lots, especially those in strip malls just over the Feather River Bridge in Yuba City. Just as old buildings seemed obsolete to civic leaders in the 1920s, downtown itself began to appear outdated by the 1970s. The area south of Third Street, which had seen little substantial investment in over a century, became the target of a redevelopment project. In 1977 three blocks were cleared for a department store, smaller shops, and library, all surrounded by parking. The project did little for business activity to the north, where commerce did not return to its 1948 level. Chinatown was spared redevelopment. Instead, it continued a slow deterioration, as the local Chinese American population dwindled and the old buildings failed to draw new tenants.[13]

2.2 HISTORICAL SIGNIFICANCE AND STATUS

2.2.1 Statement of Significance

The Marysville Historic Commercial District is significant for its association with the City's early commercial development between the 1854 and the 1948. The district was nominated for listing on the National Register of Historical Resources in 1998 and officially listed in June 1999. At the time of nomination, the district had fifty-nine contributing buildings, one contributing structure, and twenty-six non-contributing buildings. Most of the buildings were designed for retail use, though many also served residential or office purposes. This is as true today as it was during the period of significance.

2.2.2 Period of Significance (1854-1948)

The district's period of significance includes the time during which the most important events occurred in Marysville's commercial development. Resources remain to illustrate most of these developments. The opening date of 1854, an approximation, represents the construction of the district's earliest remaining buildings. The closing date, 1948, indicates that the important historical events in the development of local commerce had happened by that time. The district reflects the period through a collection of contributing buildings that retain their architectural integrity and were constructed between 1854 and 1948.

2.2.3 Integrity Statement

The district retains historic and architectural cohesiveness in several ways. First, it contains a high proportion of contributing elements, with nearly more than 70 percent of the total falling in this category. Second, as a group, contributors are larger and more conspicuous than non-contributors. All seven of the district's

[13] Ibid.

buildings over two stories contribute, for example. Further, the contributors, although constructed during a 94- year period, usually share two important characteristics. They extend to the parcel lines in the front and on the sides, and they have storefronts with recessed entrances and flanking display windows. In addition, because many non-contributors share these attributes, the district retains an overall coherence that is greater than might be expected through an analysis of its components.[14]

2.2.4 Boundary Justification and Adjacent Resources

The boundaries of the district are quite clear. To the south is the [Marysville Ring Levee]. On the west and in the area separating the two sections of the district is new commercial construction that is set back from the street and fronted by parking lots. In the north newly constructed or remodeled commercial buildings line the 500-block of D Street. Beyond Sixth [Street] residences predominate. To the east is an area of mixed uses, including civic and industrial. The boundaries follow contiguous parcel lines. Three buildings, already listed in the National Register but without commercial associations, lie just outside the district. They are the Bok Kai Temple at the foot of D Street, the Packard Library at 301 4th Street, and the Post Office at 407 C Street.[15]

The Bok Kai Temple is immediately adjacent to the MRL Phase 2B project APE and is the subject of a separate Historic Structure Impact Report. The other National Register-Listed resources are well beyond the project APE and are not subject to further analysis for this project.

[14] Ibid.
[15] Ibid.

3. PHYSICAL DESCRIPTION AND EXISTING CONDITIONS

3.1 DISTRICT DESCRIPTION

3.1.1 Boundaries

The district runs north six and a half blocks from the [Marysville Ring Levee] to Sixth Street. The street grid has a rectangular pattern and includes north-south alleys on each block. The terrain is flat. Small trees line some of the streets. The two sections of the district are of unequal size. The northern section contains about four times the area and more than twice the number of buildings as the southern section. The northern section centers on two blocks of D Street from Third to Fifth Street. Nearly half the buildings are arranged along these two blocks. All the rest are on crossing or parallel streets. The southern section extends along First Street from D Street to beyond C Street. Its contributing buildings face one of these three streets. Nearly all the buildings in both sections extend to their lot lines on each side and front the sidewalk directly with no intervening setbacks. Between the sections is an area of recent development, including new buildings, parking lots, and parcels emptied in anticipation of new construction [see Figure 2].

3.1.2 Design, Architecture, and Character

Similarity in historic function, uniformity of scale, and consistency of construction material help to define the visual character of the district. Retailing provided the original ground-floor use of nearly 90 percent of the buildings in the district. Their designs, aiming to attract customers on foot, feature storefronts with recessed entrances and flanking display windows. Most of the buildings are small scale. Ninety percent have fewer than three stories, with those with two stories slightly outnumbering those with one. Only two buildings rise above three stories. The use of brick adds another unifying characteristic to the district. About half the buildings have unfinished brick walls, and another quarter show elements of brick construction, especially flat parapets and recessed openings, even when finished with other materials.

Within the overall uniformity of the district, the individual building vary in several respects. They differ in width, from less than 20 feet to as much as 160, and in the number of storefronts on the street elevations. Despite the predominance of brick, about two-dozen buildings use stucco as the primary surfacing material. Detailing on contributing buildings varies from profuse to minimal. The most common motifs on nineteenth-century buildings have classical inspiration and include bracketed cornices, dentil and belt courses, and hooded windows. Twentieth-century buildings often feature elements of the Mediterranean Revival [style], including ceramic tile roofs or cornices and terra cotta ornament.

The district has examples of several architectural styles. Buildings of the 1850s and 1860s display a subdued classicism sometimes labeled Greek Revival. Later

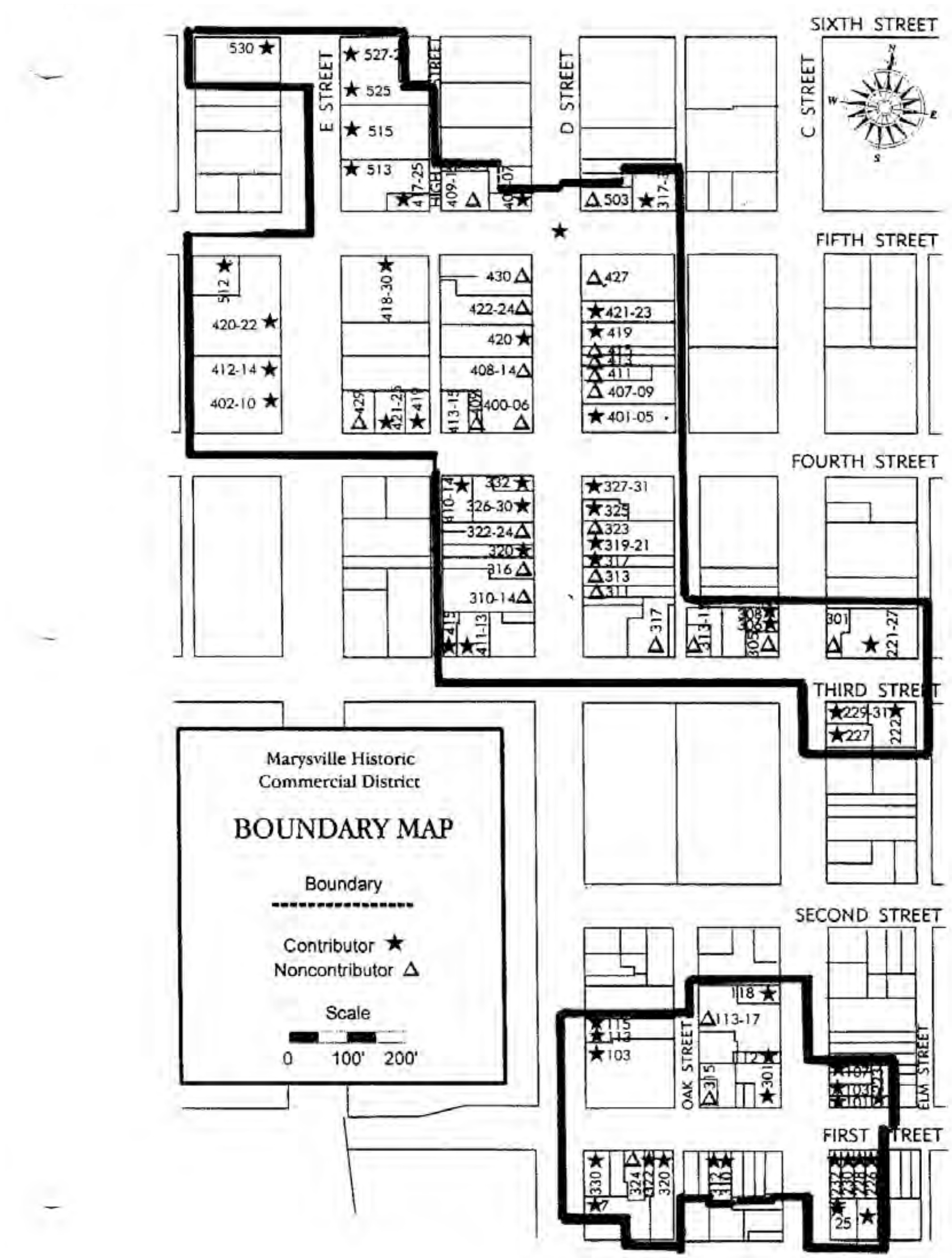

Figure 2. Marysville Historic Commercial District Map. This map is from the 1999 National Register nomination and shows the two, discontinuous sections of the district. Only the lower section is close enough to the levee to experience any possible construction-related impacts.[16]

[16] National Register District Nomination, Additional Information.

nineteenth-century buildings, notable for arched window and door openings, exemplify the Italianate style. The district also has a couple renditions of the Neo-Classical Revival and one of the Spanish Colonial Revival. [The] most popular twentieth-century style is the Mediterranean Revival, often embellished with floral Art Deco ornament. The "PWA Moderne" and Streamline Moderne are also represented in the district. Many buildings, especially those with only a single story, have completely functional designs and defy stylistic categorization.[17]

3.2 EXTERIOR CONDITIONS AND DESCRIPTION

Within the historic district, it is only the southern section that is close enough to the Phase 2B portion of the project to warrant further investigation. In December 2011, Garavaglia Architecture, Inc. toured the southern section of the historic district. Interior access to the structures was not possible, therefore visual inspections of exterior walls was done from the public right-of-way. A total of approximately 20 buildings and structures were surveyed in this manner. Of these, only the 10 buildings between First Street and the levee are close enough to the APE to potentially subjected to construction-related vibrations. All are constructed of brick and appear do date to the late 19th and early 20th centuries. They are arranged in groups of two to four (2-4) buildings, separated by empty lots. 330 First Street (Silver Dollar Saloon) and 7 D Street are the only singleton buildings. Please see Appendix A for further information on all the subject properties.

3.2.1 General

Along First Street, the buildings are constructed of unit masonry and range from two to four stories in height. Most have some occupancy, although the nature of occupancy could not be verified for this report. Generally, approximately half appear to be used for offices on a regular basis. A quarter appear to have periodic occupancy for events, celebrations, or commercial activities. Four buildings are currently unoccupied.

For the occupied buildings, similar conditions were noticed from visual inspections of exposed exterior surfaces – compromised brick surface structure, deteriorating mortar, loose material, and improper repairs.

Compromised brick surface structure
The front facades have been sandblasted and the protective fired surface of the bricks has been compromised. The pitted, uneven surface is susceptible to further degradation from water, impact, and efflorescence at an increased rate compared to brick in sound condition with its fired surfaces intact. In the best cases, the surfaces are stable and do not actively crumble with light contact. In the worst cases, the brick interior has turned to dust and the unit's stability has been compromised. This has been exacerbated by improper repairs that force water through the compromised units and further accelerate damage. (See *Improper Repairs* for further discussion.)

[17] National Register District Nomination, Section 7, 1-2.

re 3. Crack at the northeast corner of 320 Street. The sandblasted facade, poor ar, and lack of maintenance have resulted ose material at the second level.

Deteriorating mortar
The buildings within the historic district date to the 19th century and early 20th century. As such, the mortar had a low Portland cement content (potentially no Portland cement) and a high lime content. This results in a softer mortar that typically used today in modern construction. Like all materials, mortar requires periodic replacement to maintain the integrity of the wall. Many of the buildings along First Street have original, or very early mortar, that is deteriorating because of age, impact damage from sandblasting, and water exposure from improper roof drainage. The worst locations have mortar that can be raked from joints by hand, leaving bricks ill-secured and vulnerable to small surface impacts, including low-level vibrations.

Loose Material
As indicated above, loose mortar and damaged brick are found on several buildings. 226, 320, and 322 First Street are the most susceptible to these conditions. Material on their facades is already loose as a result of poor building maintenance or poorly executed repairs. Any material that can be dislodged by hand is susceptible to further loosening from low-level vibrations.

Improper repairs
Where historic materials have deteriorated, modern materials have been used for repairs. Historic brick and mortar is much softer than modern counterparts. As water travels up the wall, it carries dissolved salts and other impurities with it. It moves to the brick face through the easiest means possible and evaporates. Generally this results in a surface layer of salts and other materials that have come out of solution. In a traditional system, this evaporation happens through the softest part of the wall, the mortar. Mortar is easily repaired and in high-lime mortars, somewhat self-repairing. Where modern materials have been introduced, water is forced into the historic wall sections. This forces an increased amount of salts to crystallize at the face of the historic brick.

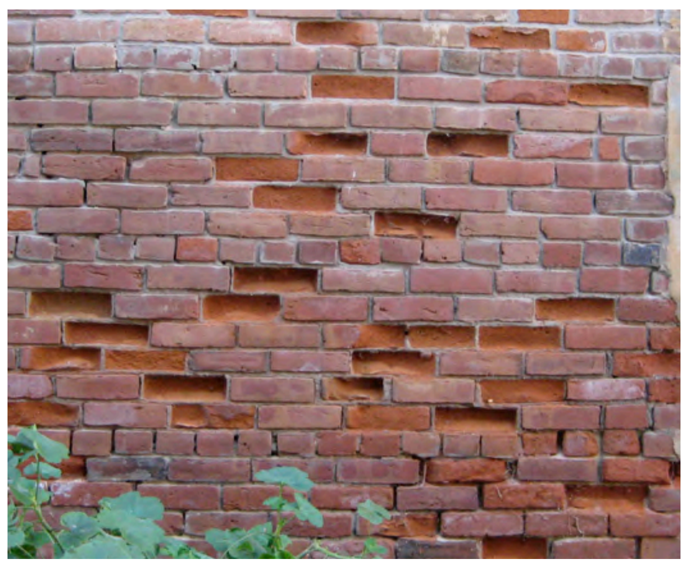

Figure 4. Spalled brick, typical. The quality of brick varies throughout the district. Poor brick and improper repairs have lead to widespread failure of many units.

Crystallization is an expansive process that ends up causing spalling of the fired brick face. The soft inner volume then washes away with repeated moisture exposure leaving voids in the wall, framed by the modern, harder, less permeable mortar.

3.3 STRUCTURAL CONDITIONS AND DESCRIPTION

3.3.1 General Conditions

The structures in general are all fairly well maintained with the exception of the buildings located at 226, 228, and 230 First Street. All the buildings surveyed are constructed of unreinforced brick masonry with some concrete block and wood frame additions. The second floor and roof framing is also wood. Structures constructed of unreinforced masonry have inherent deficiencies that make them susceptible to damage due to seismic loads or other heavy vibrations. The common deficiencies noted are as follows:

- *Parapet Bracing*
  The parapets extend more that 12-inches above the roof plane without proper bracing. These parapets are unstable under seismic loading and may be unstable when subjected to continual, low-grade vibrations. This condition could result in collapse.

- *Out-of-Plane Wall Anchorage*
  There is a lack of continuity between the heavy masonry walls and the wood floor and roof diaphragms. This can result in separation and collapse under seismic loading.

- *In-Plane Shear Transfer*
  There is a lack of continuity between the floor and roof diaphragms for shear transfer. This can result in separation and collapse under seismic loading.

- *Floor and Roof Diaphragms*
  The floor and roof diaphragms typically are not adequate to support the lateral seismic loads imposed by the heavy masonry walls without strengthening or additional interior shear walls or frames.

- *Store Front Shear Deficiency*
  This is a common deficiency. The open store front does not provide adequate shear resistance at the front elevation. This condition may result in collapse.

- *Quality of Brick and Mortar*
  In this particular case it is apparent that there are issues regarding the quality of the construction materials. This is described in Section 3.2. These issues will impact the performance of the structure.

These deficiencies are most critical when the building is subjected to seismic loading. The anticipated construction-related vibrations are much smaller but can cause architectural cracking and minor separations when the structure has these major structural discontinuities. Adequate monitoring as described in the recommendations section is imperative.

3.3.2 Specific Conditions

There are exceptions to the general structural conditions described above:

226 First Street
The main building at 226 First Street is extremely deteriorated. There is a section of the front facade that is already separating and is very unstable, and the rear wall of the original building appears to be leaning at the top. These areas of the building are unstable and should be braced.

Secondary Building at 226 First Street
The accessory building at the rear of 226 First Street is extremely deteriorated. There is no roof and the walls are currently leaning. These walls are unstable and should be braced.

320 First Street
The building at 320 First Street was retrofitted in the 1980s. This retrofit appears to have addressed all the major deficiencies except parapet bracing.

4. VIBRATIONS PARAMETERS

Potential impacts on the Marysville Commercial Historic District due to the MRL project are likely to be the result of vibrations caused by construction nearby. Vibrations are caused by construction activities themselves, such as blasting, drilling, compacting, etc. as well as by everyday activities related to construction such as material transport, material movement on adjacent streets, construction activities on staging sites, etc. In the K1 and K2 sections of Phase 2B, a small staging site is proposed for an empty lot immediately adjacent to the southeast corner of the historic district, adjacent to the Levee District office. Construction activities range from 10-100$^+$ feet from the closest historical resources to the APE. How buildings react to these increased events is as much a function of condition, construction, and location as it is of the project-related activities themselves. Therefore, a determination of impacts must establish a baseline threshold for construction-related events then analyze the individual buildings' ability to tolerate those vibrations.

4.1 LITERATURE REVIEW

To place modern understanding of the impacts of construction-related vibrations on buildings into context, it is important to consider the international body of work on the subject. Generally, the British and German standards are most heavily referenced, although Swiss standards play an important role in studies done by Caltrans. In the United States, the body of work is a mixture of data from large construction projects, such as Boston's Big Dig project, and data collected by the federal government agencies such as the Bureau of Mines. Each study references earlier studies and each is based on particular sets of criteria that are not necessarily translatable across situations, or across applications. Therefore, while there is relative consistency in the findings, the methodologies can differ.

For the purposes of this analysis, information is primarily presented from the most widely referenced international standards and compared with the common domestic standards. Differences to keep in mind include nuances of language. Many of the German studies are not translated into English. Those that are available as translated documents are provided by the German government only. Therefore, slight nuances of translation are lost because the translation is from a single source.

4.1.1 Overview - German Standards

Internationally, the German standards are generally considered to be the most restrictive when considering impacts from vibrations on structures. In actuality, there are three building-related vibration German standards: DIN 4150-1, DIN 4150-2, and DIN 4150-3. DIN 4150-1 discusses the mathematical evaluation of vibration parameters, such as creating attenuation curves. DIN 4150-2 describes how to evaluate human exposure to vibrations from construction activities. DIN 4150-3 discusses measuring and evaluating the effects of vibrations on structures (non-earthquake loading). Of these, only DIN 4150-2 and DIN 4150-3 have been translated into English and made widely available to the international engineering community. For the purposes of this analysis, DIN 4150-3 is the most applicable to the immediate goals of establishing vibration thresholds for the historic resources near the MRL project. It includes evaluation of vibrations on pipelines, non-cohesive soil settlement, vibrations in floors and walls, as well as generalized methods for reducing vibrations from construction activities.

The German standards are integrated and broad. The DIN 4150-3 incorporates by reference six other German standards. Most have not been translated into English. DIN 4150-3 includes evaluation of vibrations on pipelines, non-cohesive soil settlement, vibrations in floors and walls, as well as generalized methods for reducing vibrations from construction activities.

One concern with referencing the German standard for an international audience is that the German authorities have never provided any information on how the standard was set. Further complicating comparisons is the differences in definitions of what constitutes a short-term vibration versus a long-term vibration. Section 3.4 of DIN 4150-3 defines a short-term vibration as: "vibration which does not occur often enough to cause structural fatigue and which does not produce resonance in the structure being evaluated." Section 3.5 defines a long-term vibration as: "all types of vibration not covered by the definition of 'short-term vibration' in subclause 3.4" (i.e. dynamic/harmonic vibrations).

In DIN 4150-3 the definitions for short- and long-term vibrations are based on the ability of those vibrations to cause damage. A short-term vibration can cause damage, but not structural fatigue. A long-term vibration causes structural fatigue and building resonance. DIN 4150-3 occasionally refers to long-term vibrations as harmonic. A weak impulse or continuous vibration that does not cause structural fatigue (but causes cosmetic cracking) would be called a short-term vibration while a vibration (impulse or continuous) strong enough to cause structural fatigue or building resonance would be classified as a long-term vibration.

4.1.2 Overview – British Standards

The British have two vibration standards, BS 5228-2 (2009) and BS 7385-2 (1993) (see Figures 5a and 5b). BS 5228-2 covers vibration control on construction and open sites and BS 7385-2 covers evaluation and measurement of vibrations in buildings. These standards have evolved over the years and sometimes the recommendations between the two publications have differed. They currently are consistent. Vibration level recommendations in both standards are judged to give a minimal risk of direct vibration-related cosmetic damage (threshold values- formation of hairline cracks). The PPV values are frequency dependent.

BS 5228-2 (2009) provides recommendations for retaining walls (no lateral support). For walls in good condition, the threshold limit for transient vibrations is 0.4 in/sec (10 mm/s) (PPV) at the base of the wall and 1.6 in/sec (40 mm/s) at the top. For continuous vibrations, the recommend limits should be reduced by a factor of 1.5 to 2.5 depending on circumstances and external supports may be needed.

4.1.3 Overview – United States Studies

The Federal Railroad Administration (FRA) provides a vibration damage threshold criterion of 0.5 in/sec (12.7mm/s) for fragile buildings and 0.12 in/sec (3 mm/s) for extremely fragile historic buildings from typical construction equipment.[18] These criteria were taken from Swiss standards. The FRA report provided typical vibration levels for construction equipment, and defined frequent events as more than 70 events per day.

[18] United States Department of Transportation, "High-Speed Ground Transportation Noise and Vibration Impact Assessment, Report 293630-1," (1998).

Line [see Figure 9b]	Type of Building	Peak Component Particle Velocity in Frequency Rage of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s [1.97 in/s] at 4 Hz and above	50 mm/s [1.97 in/s] at 4 Hz and above
2	Unreinforced or light framed structures Residential or light commercial buildings	15 mm/s [0.59 in/s] at 4 Hz increasing to 20 mm/s [0.79 in/s] at 15 Hz	20 mm/s [0.79 in/s] at 15 Hz increasing to 50 mm/s [1.97 in/s] at 40 Hz and above

Figure 5a. Transient vibration guide values for cosmetic damage. Values referred to are at the base of the building. For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (0.02 in) [zero to peak)] is not to be exceeded.

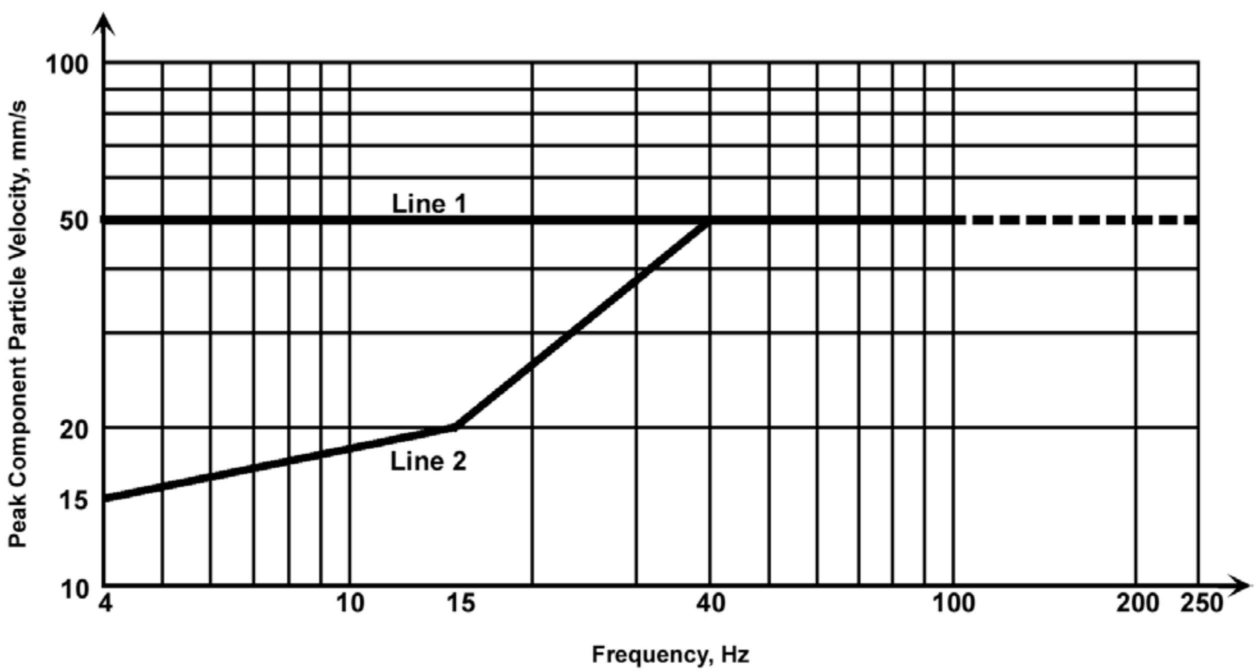

Figure 5b. Transient vibration guide values for cosmetic damage. Transient vibration guide values for cosmetic damage for the current BS 5228-2 (2009). This diagram was originally developed for BS 7385-2 (1993) and was included in BS 5228-2 in 2009. Cosmetic damage is defined as creation of hairline cracks. The accompanying text indicates that minor damage is possible at vibration levels twice that shown, and major damage can occur at four times the listed values. For continuous vibrations, the guide values might need to be reduced by half. Important buildings that may be difficult to repair might require special consideration on a case-by-case basis. A historical building should not be assumed to be more sensitive unless it is structurally unsound. BS 7385-2 notes that the probability of [cosmetic] damage tends towards zero at 12.5 mm/s (0.49 in/s) PPV.

Findings in report RI-8507 by the U. S. Bureau of Mines are commonly used to define minimum ground vibration levels for structural and cosmetic damage to buildings from blasting.[19] These recommendations are based upon detailed monitoring of one- and two-story wood framed houses in good condition that were built to 1980's construction standards. The vibration limits were set at a 95 percent confidence level with a 5 percent chance that damage could occur below the proposed limits (Figure 6). The authors noted that no damage had been recorded occurring below 0.5 in/s (12.7 mm/s). They indicated that their vibration limits should not be applied to steady state sources such as traffic because of the different nature of those vibrations.

RI 8507 also provides safe blasting vibration criteria for residential structures. The data upon which this criteria is based is well documented, widely available, and was the result of many years of full-scale testing and monitoring. The criteria are frequency based and are taken from ground measurements adjacent to the foundation. The criteria are expressed as probabilities. It was noted that the probability of cosmetic damage from PPV values below 0.5 in/s is small (5 percent for the worst case) and decreases rapidly.[20] However, this study only evaluated blast vibration effects on buildings.

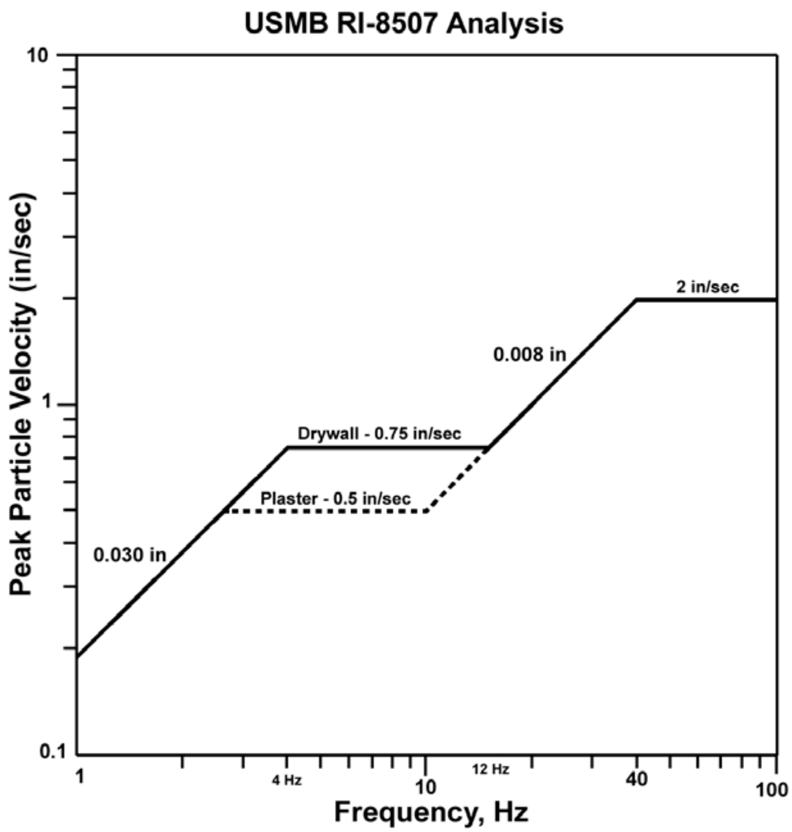

Figure 6. Figure B-1 from Siskind, et al (1980). This shows their vibration limits for safe blasting near homes (transient vibrations). This diagram was not to be used for continuous vibrations.

[19] D.E. Siskind, M.S. Skagg, J.W. Kopp and C.H. Dowding, *Structure Response and Damage Produced by Ground Vibration From Surface Mine Blasting*, (United States Bureau of Mines, 1989). The term vibrations will refer to ground vibrations unless otherwise indicated. Vibration values refer to the Peak Particle Velocity (PPV) of the full waveform.
[20] Siskind et al., 1989, 68.

The Federal Transit Authority (FTA) set a vibration limit of 0.12 in/s for fragile historic structures.[21] Many projects use this value for historic buildings. The FTA analysis are commonly used for low-level, continuous vibrations, such as trains and light rail projects.

For construction projects within the City of New Orleans, the City Government set the following vibration limits.[22]

Structure and Condition	in/sec
Historic structures	0.25
Residential structures	0.25
New residential structures	0.5
Industrial building	1.0
bridges	1.0

Figure 7. Limiting sustained peak particle velocities. Limits as applied by the City of New Orleans based on studies of preconstruction vibrations and conditions at the LSU Medical Center in New Orleans.

The PPV is the largest along any of a 3-axis geophone and the PPV values are for sustained (continuous) vibrations.

4.1.4 Caltrans Vibrations Standards

As required by the MOA, Caltrans *Transportation- and Construction-Induced Vibration Guidance Manual* is the guiding document for this project in terms of determining appropriate vibrations levels within the APE where historic resources may be impacted. In this manual, Caltrans references standards developed by various parties over the last 30 years for various types of buildings, including many of the studies noted in the preceding sections as well as other supporting analysis, including those conducted by Yong Chae and the Swiss Association of Standardization.

The Chae Building Vibrations Criteria state a range for single-events of 0.5-1 in/sec PPV for old buildings in "poor to very poor" condition and a repeated-events threshold of 0.5 in/sec PPV.[23] (It does not provide a repeated-events threshold for those buildings in the "very poor" category.) The Swiss Association of Standardization notes single-event vibration ranges from 0.3 – 1.2 in/sec PPV and continuous-source ranges from 0.12 – 0.5 in/sec PPV for a variety of building classes (see Figure 8.)[24] The Swiss Association of Standardization recommendations (SN640312a, April 1992) have become a standard classification used by Caltrans and other entities as a guideline for both continuous and single-event vibration sources.[25]

[21] Carl E. Hanson, David A. Towers and Lance D. Meister, *Transit Noise and Vibrations Impact Assessment, FTA-VA-90-1003-06*, (Federal Transit Administration, 2006), 12-13.
[22] Professional Service Industries, Inc., *Report of Preconstruction Survey and Vibration Monitoring Services, LSU Medical Center, New Orleans, Louisiana*, (Stanley Group, January 13, 2010), Table 2, 6.
[23] Yong S. Chae, "Design of Excavation Blasts to Prevent Damage," Civil Engineering, ASCE, (Vol. 48, No. 4, 1978) as presented in *Transportation and Construction Induced Vibration Guidance Manual*, Caltrans, 2004, 16.
[24] "Swiss Association of Standardization Vibration Damage Criteria Building Class," as presented in *Transportation and Construction Induced Vibration Guidance Manual*, Caltrans, 2004, 16.
[25] Ibid.

Building Class	Continuous Source PPV (in/sec)	Single-Event Source PPV (in/sec)
Class I: buildings in steel or reinforced concrete, such as factories, retaining walls, bridges, steel towers, open channels, underground chambers, and tunnels with and without concrete alignment	0.5	1.2
Class II: buildings with foundation walls and floors in concrete, walls in concrete or masonry, stone masonry retaining walls, underground chambers, and tunnels with masonry alignments, conduits in loose material	0.3	0.7
Class III: buildings as mentioned above but with wooden ceilings and walls in masonry	0.2	0.5
Class IV: construction very sensitive to vibration; objects of historic interest	0.12	0.3

Figure 8. Swiss Association of Standardization Vibration Damage Criteria

In addition to recommended vibrations thresholds, the Swiss study established a structural categorization system based on construction types. This information is paraphrased in Figure 8. While it lists historic buildings as a category IV type of construction, the conditions of the subject historic district buildings would more accurately categorize them between Categories III and IV. This corresponds to a continuous source vibrations range of 0.12 – 0.2 in/sec. However, even the buildings in the best condition do not appear to have full modern seismic strengthening; although approximately 75% do show elements of limited structural enhancements such as floor-level thru-bolts.

Like the Bureau of Mines report, RI 8507, more recent studies cited in the Caltrans report discussed vibrations in term of the probability of certain types of damage occurring at different levels of vibrations exposure. For each type of damage they provide a range of exposure that has a certain likelihood causing an impact. For instance, the report draws upon the Whiffen Vibrations Criteria for continuous events to illustrate the types of damage that can be expected at various sustained vibrations levels (see Figure 9).[26]

PPV (in/sec)	Effect on Buildings
0.4 - 0.6	Architectural damage and possible minor structural damage
0.2	Threshold at which there is a risk of architectural damage to houses with plastered walls and ceilings
0.1	Virtually no risk of architectural damage to normal buildings
0.08	Recommended upper limit of vibrations to which ruins and ancient monuments should be subjected
0.006 – 0.019	Vibration unlikely to cause damage of any type

Figure 9. Whiffen Vibration Criteria for Continuous Vibration

[26] A. C. Whiffen, "A Survey of Traffic-Induced Vibrations," (Crowthorne, Berkshire, England: United Kingdom Department of Environment, Road Research Laboratory, 1971,) as presented in *Transportation and Construction Induced Vibration Guidance Manual, Caltrans*, 2004, 17.

	PPV (in/sec)			
Damage Type	**5% probability**	**10% probability**	**50% probability**	**90% probability**
Threshold damage: loosening of paint, small plaster cracks at joints between construction elements	0.5	0.7	2.5	9.0
Minor damage: loosening and falling of plaster, cracks in masonry around openings near partitions, hairline to 3mm (1/8-inch) cracks, fall of loose mortar	1.8	2.2	5.0	16.0
Major damage: cracks of several mm in walls, rupture of opening vaults, structural weakening, fall of masonry, load support ability affected	2.5	3.0	6.0	17.0

Figure 10. Siskind Vibration Damage Thresholds

The Caltrans manual goes on to reference the likelihood of certain types of damage from the same 1980 Siskind et. al study referenced by the Bureau of Mines in RI 8507 (see Figure 10).[27]

The combination of these and other relevant studies became the basis for the threshold limits recommended in the 2004 report and subsequently used by Caltrans for construction project near historic buildings. These recommendations are summarized in Figure 11.[28]

	Maximum PPV (in/sec)	
Structure and Condition	**Transient Sources**	**Continuous/Frequent Intermittent Sources**
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Figure 11. Caltrans vibrations threshold recommendations for various types and conditions of buildings. Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

4.1.5 Analysis of Caltrans Vibrations Threshold Recommendations

In the U.S., the terms short- and long-term vibrations are generic terms that describe the duration of a vibration, while the terms impulse, semi-continuous, and continuous are

[27] Siskind et al., as presented in *Transportation and Construction Induced Vibration Guidance Manual*, Caltrans, 2004, 17.
[28] Table 19, *Transportation and Construction Induced Vibration Guidance Manual*, Caltrans, 2004, 26.

descriptors used to describe the nature/style of a vibration. The terms are not related to the ability of vibrations to cause damage. This is how the definitions are applied in the Caltrans manual – they are time dependent and not related to ability to cause damage even though they are based on studies that equate values to capacity to cause damage.

This is contrasted with the German DIN 4150-3 standard. The German standard defines duration as the time until damage occurs. Caltrans does not adopt these definitions and instead discusses vibrations in terms of their duration of use. The two sets of definitions are therefore not directly interchangeable. Figures 12 and 13 provide a summary of the vibrations limits presented in DIN 4150-3 for short-term vibrations, or for vibrations exposure that is not great enough to cause damage. Because the goal of this Historic Structure Impact Report is to establish initial parameters for avoiding potential damage, the German definition of "short-term" vibrations is most applicable (and is most closely represented by Caltrans' analysis.)

Caltrans lists recommended PPV limits for continuous vibrations that have PPV values based on the peak vertical axis velocity in the ground adjacent to a building. The values were taken from Whiffen and Leonard who assembled it from an earlier German DIN standard that has since changed.[29] Since then, the long-term (i.e. continuous) DIN vibration guideline for ancient

Line	Type of structure	Guideline values for velocity, v_i, in mm/s			
		Vibration at the foundation at a frequency of			Vibration at horizontal plane of highest floor at all frequencies
		1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz*	
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20	15
3	Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (e.g. listed buildings under preservation order)	3	3 to 8	8 to 10	8
* At frequencies above 100 Hz, the values given in this column may be used as minimum values.					

Figure 12. Guideline values for vibration velocity to be used when evaluating the effects of short-term vibration on structures, DIN 4150-3 vibration recommendations, 1999. In Section 5.1, of DIN 4150-3 (1999) $|v|_{i,max}$ is defined as the maximum absolute value of the velocity signal for the three components (x, y, or z) measured on the building foundation. This parameter is referred to as V_i . This is not a vector sum value. Measurements can also be made on the highest floor of a building. In this case, the highest of the two horizontal components shall be used. This value is also referred to as V_i . Note that the guideline values are frequency dependent if vibrations at foundation level are measured, and not frequency dependent if vibrations are measured on the top floor.

[29] Whiffin and Leonard, 1971.

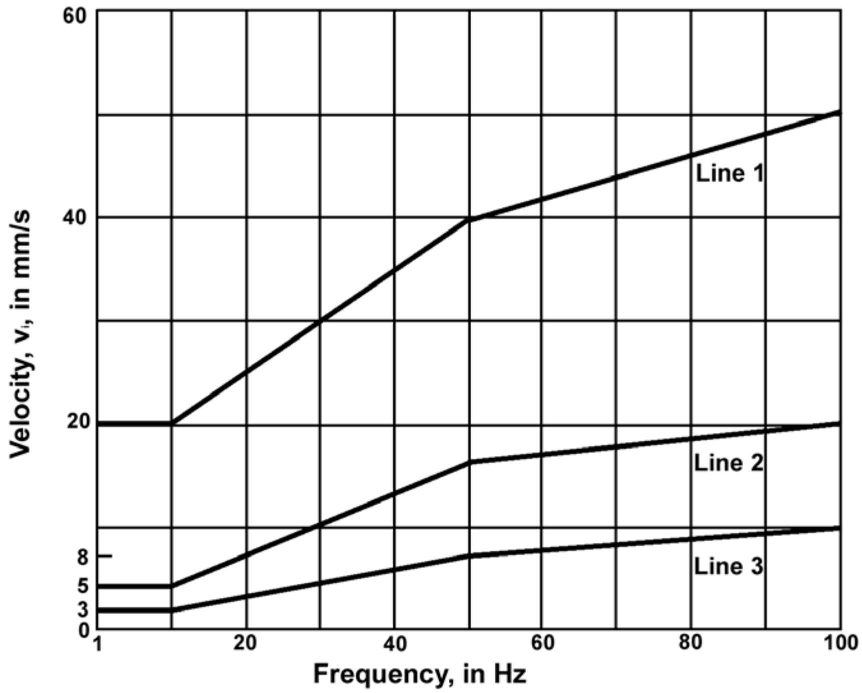

Figure 13. Curves for guideline values specified in Figure 12 for velocities measured at the foundation DIN 4150-3 vibration recommendations, 1999.

monuments has increased from 0.08 to 0.1 in/sec. The current short-term (i.e. non-continuous) DIN vibration guideline for ancient monuments is 0.1 in/sec, and the method on how the vibrations are measured has since changed as well.

The current DIN guidelines for short-term (non-continuous) vibrations are .012 - 0.31 in/sec for old buildings, depending on the frequency. For continuous vibrations (long-term vibrations as defined by Caltrans) the guidelines would be 0.1 in/sec, measured on the top floor.

The main differences between the current DIN standard and the one used by Caltrans are:

- The structure types have been renamed/condensed into three types: industrial, houses, and sensitive structures.

- The current DIN uses the vector sum to calculate velocity instead of just the vertical axis. This likely caused the increase in the vibration limit for sensitive structures from 0.08 to 0.1 in/sec. The PPV values are not frequency dependent.

- The method for measuring vibrations has changed between the DIN 4150-3 version references in the Caltrans manual and that currently in use today. The sensor is placed on the top floor of the structure, not on the ground adjacent to the foundation. Seismic amplification is now included, making the vibration limit even more restrictive. An equivalent ground-level velocity could be as low as 0.04 in/sec. This is well in the range of background traffic vibrations.

The Alternatives Analysis does not contain any proposed construction methods that involve pile driving or other types of quasi-continuous vibration producing machinery. This suggests that the use of either long-term vibration guidelines (DIN 4150-3) or continuous (long-term) vibration guides from the Caltrans manual may too conservative. To put this in perspective, the Swiss non-blasting vibration standard for historic buildings is 0.12 to 0.2 in/sec (Figure 8).[30]

4.2 SITE SPECIFIC CONDITIONS

Preliminary evaluations completed in January 2010 looked at the proposed construction methods and site specific conditions to develop anticipated construction-generated vibrations levels for the MRL Phase 2B project. It assumed high-impact equipment, such as vibratory rollers would not be allowed and adopted a very conservative approach to estimating vibrations levels based on the use of bulldozers and other earthmoving construction equipment. As the project has developed, limited use of vibratory rollers is likely. Therefore, the following discusses potential vibrations from both earthmoving equipment and vibratory rollers.

According to Table 18 in the Caltrans study, earthmoving equipment would generate vibrations of 0.089 in/s at a distance of 25 feet. Vibratory rollers would generate vibrations of 0.210 in/s at the same distance.

This value was calculated using Equation 10 of the Caltrans study:

$$PPV_{Equipment} = PPV_{Ref}(25/D)^{n} \quad (in/s)$$

In this equation, *D* is the distance from the vibration source and *n* is a coefficient based on soil type. Gathering information from boring 2F-08-61 taken at the levee crown near the steps at the Bok Kai Temple, project engineers classified the soils in the area as "low-plastic, stiff to hard Sandy Silts (ML) and medium dense to dense Silty Sands (SM) with Standard Penetration test blow N60 values ranging from 10 to 50 with a median value of 33."[31] From this, a value for *n* of 1.1 was selected, as it was the value used by Caltrans to obtain the 0.089 in/s and 0.210 in/s values and it was more conservative than the coefficient corresponding to site specific conditions.

Caltrans used a distance of 25 feet, but with an average construction distance of 75 feet or more, a median distance of 40 feet was used by project engineers to assess potential vibrations. Looking at a distance of 40 feet and using a *n* coefficient of 1.1, project engineers calculated the following as a very conservative estimate of anticipated continuous vibrations from heavy equipment for the project:

$$PPV_{Equipment} = PPV_{Ref}(25/D{=}40)^{1.1} \quad (in/s)$$

$$PPV_{Equipment} = 0.05 \quad (in/s)$$

Using this same formula, and a reference PPV of 0.210 in/s for vibratory rollers, the anticipated vibrations from these rollers at a distance of 40 feet is 0.13 in/s. To reiterate, this value assumes

[30] Skipp (1998) contains good review of the framework of European vibrations standards.
[31] "Memorandum for Record: Marysville Ring Levee EDR – Bok Kai Temple Construction Impact Evaluation," (January 14, 2010), 2.

large, heavy construction equipment within 40 feet of the Bok Kai Temple. In reality, anticipated construction methods generally utilize equipment that generate vibrations levels well below that of a large bulldozer, and operation would be primarily limited to distances greater than 40-feet from the buildings on the south side of First Street. Limited use of vibratory rollers is anticipated. However, the soils at the site have steeper attenuation curves, thereby reducing vibrations at a faster rate as distance from the source is increased. They are classified as Class II soils with a *n* value of 1.3 and would therefore result in even lower anticipated PPV values than that presented above.

4.3 Analysis and Anticipated Impacts

4.3.1 Application of Theoretical Data

In widely applied studies, the recommended thresholds for vibration levels range from 0.04 to 0.5 in/sec. The core level range is 0.08 to 0.2 in/sec. Based on the information presented in Figures 9, 10 and 11, the data suggests that even at the average upper threshold of 0.2 in/sec, there is a less than 5% chance of damage to loose plaster and paint, of falling plaster and dislodging of loose mortar, and of major damage. Caltrans recommendations of 0.08 – 0.12 in/sec for the most fragile resources, fall within this average range and are more conservative than many of the recommendations in other studies. This suggests that at the maximum vibrations threshold recommended by Caltrans has a less than 5% probably of causing further damage to loose plaster and paint, or causing falling plaster and dislodging of loose materials.

Using a conservative average distance of 40 feet, project engineers calculated an anticipated continuous-source vibrations level of 0.05 in/s for bulldozers and earthmoving equipment. Using their parameters, an anticipated continuous-source vibrations level of 0.13 in/s is anticipated for vibratory rollers at 40 feet.. This is consistent with the vibrations threshold recommended by Caltrans, and is still lower than the values expected to cause even minor aesthetic damage.

4.3.2 Comparison with Ambient Vibrations and Phase 1 Vibrations

For many subject buildings, everyday vibrations from street traffic, passing trains, and minor seismic events often produce vibrations in excess of those recommended in the charts presented. Therefore, the proposed construction methods are anticipated to generate vibrations well below the conservative ranges of value needed to cause architectural damage. The level is so low that structural damage is highly unlikely.[32]

For comparison of actual construction-generated vibrations, readings taken from Phase 1 of the Marysville Ring Levee project generally ranged from 0.01 in/sec to 0.04 in/sec. Monitors were placed at the toe of the levee, measuring vibrations at a distance much closer to construction activities than is anticipated for the Marysville Historic Commercial District contributing buildings along First Street. Soils at the Phase 1 locations are comparable to those within the Phase 2b APE and the construction methods are similar to those proposed for the Phase 2b work. This average range of vibrations from the Phase 1 APE is below those levels anticipated for Phase 2b and demonstrates the capability of the proposed methods to comply with the Caltrans recommended long-term, or continuous, vibration levels of 0.08-0.12 in/sec for fragile structures.

[32] Ibid., 3.

4.3.3 Vibrations-Related Settlement

Within the fields of geophysics and engineering that deal with vibrations analysis, there are two general views on low-level vibrations (such as those generated by the proposed construction methods) and soil settlement. The common view is that there are vibration limits (approximately 0.1 in/sec) and shear strain limits (approximately 0.01%) below which ground settlement (compaction/strain accumulation) in granular soils does not occur.[33] The other view is that any level of ground vibration (no matter how small) over a sufficient length of time will cause strain accumulation, and thereby deformation, in granular soils.[34]

Within the last decade a series of German Doctoral theses and papers studied the relationship between long-term, low-level ground vibrations and settlement in granular soils.[35] These studies combined cyclic loaded, triaxial tests over a range of frequencies and up to 100,000 cycles with 2-D numerical models. The key findings of these studies are:

> The cyclic loading follows Miner's rule. This was experimentally checked with multiple triaxial tests with over 100,000 cycles. Miner's rule (also called Miner's cumulative fatigue damage ratio) is based on the idea that every stress cycle (large or small) uses up a proportional part of the fatigue life of a structure. In granular soils, shear stresses (cyclic load) cause compaction until the void ratio for that particular stress level is reached. That stress can continue to be applied, but no additional compaction will occur. In a loading sequence, the peak stresses cause most of the settlement and are the most important. The average stress is unimportant. Also, the order or frequency that large or small stresses are applied does not alter the end result.[36]

In summary, the soil type, soil conditions, and peak vibration levels control the amount of settlement/compaction that can occur. No additional settlement will occur unless the vibration levels are increased.

In this analysis, we assume that the minimum shear strain to cause a soil volume change (settlement/compaction) is 0.01%.

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[33] Roy H. Borden, Lisheng Shao and Ayushman Gupta, *Construction Related Vibrations*, *FHWA/NC/94-007*, (Federal Highway Administration/North Carolina Division Study, 1994); S. Drabkin, H. Lacy and D.S. Kim, "Estimating Settlement of Sand Caused By Construction Vibration," American Society of Civil Engineers Journal of Geotechnical Engineering, (November, 1996), 920-928; K.R. Massarsch, "Settlements and Damage Caused by Construction-Induced Vibrations," Proceedings from the International Workshop Wave (2000), 299-315; A.S. Suiker, "The Mechanical Behaviour of Ballasted Railway Tracks," (Germany: Delft University: PhD thesis, 2002); C.C. Hsu and M. Vucetic, "Volumetric Threshold Shear Strain for Cyclic Settlement," Journal of Geotechnical and Geoenvironmental Engineering (Vol. 130, No.1, 2004), 58-70.
[34] T. Wichtmann, "Explicit Accumulation Model for Non-Cohesive Soils Under Cyclic Loading," (Germany: University of Bochum: PhD thesis, 2005).
[35] Suiker, 2002; S. Werkmeister, "Permanent Deformation Behaviour of Unbound Granular Materials in Pavement Constructions," (Germany: Dresden University: PhD thesis, 2003);, Wichtmann, 2005; T. Wichtmann, A. Niemunis and T. Triantafyllidis, "Strain Accumulation in Sand Due to Drained Cyclic Loading," Soil Dynamics and Earthquake Engineering (Vol.30, No.8, 2010), 736-745.
[36] C. Karg, "Modeling of Strain Accumulation Due to Low Level Vibrations in Granular Soils," (Belgium: University of Gent, PhD thesis, 2007).

Within the Marysville Historic Commercial District, the near surface site soils are loose sands and likely have a relatively high void ratio. We assume that the shear velocity is in the 500 ft/sec range.[37] Using the recommended vibrations threshold of 0.08 in/sec maximum PPV:

Shear Strain = PPV/shear velocity
= [0.08 in/sec]/[(500 ft/sec)*(12 in/ft)
= 0.000014
= 0.0014% strain

This strain value is much less than the minimum strain (0.01%) needed for settlement to develop. It would require a PPV greater than 0.5 in/sec before settlement is likely to present a problem.

4.3.4 Conclusions

The overall conditions of the historic district contributing buildings range from poor to good. The concern is not necessarily with structural failure, but minor damage to materials already compromised by their current conditions or damage from loose decorative materials within the buildings. These include loose bricks, unsupported parapets, materials on unsecured shelves, and items not firmly attached to the walls.

Based on the proposed construction methods it appears the anticipated 0.05 in/sec levels are well below internationally recognized damage thresholds. The relatively good condition of most of the historic district buildings is another factor for consideration. Following the Caltrans manual and information in the general body of work on the subject, Garavaglia Architecture, Inc. recommends a conservative upper vibrations limit of 0.08 in/sec PPV. This value has a low probability of causing vibrations-related damage and is well within the anticipated range of vibrations induced by construction activities.

[37] B.O. Hardin and F.E. Richart Jr., "Elastic Wave Velocities in Granular Soils," Proceedings of the American Society of Civil Engineers (Vol.89, No. SM1, 1963), Figures 6-7, 33-65.

5. RECOMMENDATIONS

5.1 PRE-CONSTRUCTION

Prior to beginning construction, it is important to establish the baseline conditions under normal circumstances. This provides a reference point for comparison of altered conditions both during and after construction. During this time, it is also highly recommended that public outreach be increased to prepare the residents and business-owners for the possible disruptions caused by construction activities. This is also an opportunity to educate the public on what they can do to minimize potential indirect damage of their property and to establish reasonable expectations for construction, communication, and project scope.

5.1.1 Establishing Baseline Vibrations Conditions

Ambient conditions along First Street and adjacent to the K1, K2, and L1 segments of the MRL project already include vibrations from heavy traffic, large vehicles, and regular freight train service. On top of this, these areas have been subjected to other intense development and construction project within the last 50 years, including major work on the Levee in the early 1960s. In general, all buildings near the APE experience vibrations of some sort on a daily basis. It is possible that these ambient levels are below the anticipated construction-generated vibrations thresholds. However, only systematic testing of current, pre-construction conditions can establish the difference between the norm and the proposed. Therefore, the following tests are recommended:

- *Proposed construction equipment and methods*
  Some of the construction methodologies being considered for the Phase 2b work are currently being implemented on another segment of the levee as part of Phase 1 work. Soil conditions are similar as well. Therefore, measurement of the vibrations generated by both equipment and methods in Phase 1 is directly applicable to work associated in Phase 2b. Measurements taken between June 21, 2011 and October 11, 2011 showed a vibrations range of 0.01 – 0.04 on average, as measured at the toe of levee. Comparing the theoretical and limited empirical data from the recommendations in this study with real-world conditions demonstrates the validity of the proposed construction methods to limit damages to historic resources from construction-related vibrations.

- *Ambient vibrations levels from traffic and trains*
  The amount and types of traffic in the area generate surface vibrations do not yet appear to have caused aesthetic or structural damage to the historic district buildings. A comparison between the existing, daily vibrations levels to those anticipated for construction activities will provide for more detailed outreach and preparedness planning.

5.1.2 Establishing Baseline Building Conditions

Understanding the difference between current conditions and those anticipated during and after construction is even more critical for individual buildings. A reference point is necessary for comparison of condition changes during construction, and possibly for use in determining the cause of any conditions changes. As a means to protect the project sponsors from unsubstantiated claims of damage, a baseline of existing building conditions should be recorded prior to starting construction. Depending on the resource and access to the various elevations and spaces for each building, different methodologies can be employed. Specific recommendations are as follows:

- *3D laser scans or photogrammetry*
  These methods are most appropriate for building exteriors or for spaces that are large enough to allow for entire walls to fit within a single view. Laser scans are the most common method for this type of recordation. It is fast and relatively cost effective. Multiple scans can be done in a single day with processing of the raw data completed over a period of several weeks. It is possible to collect the data and process it at a later date on an as-needed basis. In general, resolution and accuracy vary. Determination of the most appropriate equipment should be done in consultation with a trained operator who is experienced with scanning architectural subjects in the field.

  This method is recommended for relatively flat building surfaces where the view is straight on. For the most of the buildings on the south side of First Street, this technology can be used for the primary elevation at a minimum. Because of the number of empty lots, some buildings will be able to have up to three sides recorded in this manner.

- *Systematic recordation with high resolution digital photographs*
  As an alternate to laser scanning, thorough recordation of all surfaces with a digital camera can be used to establish a visible baseline of conditions. This method is relatively quick and inexpensive although it won't be able to record hairline cracks with much precision and differences in rough surfaces, such as a sandblasted brick wall, may be difficult to discern. This method is best used in combination with a hand-recorded survey on interior elevation drawings. For all of the subject buildings in the historic district, interior and exterior elevation drawings would need to be created to enable accurate recordation of surface cracks and other existing conditions.

  Photographs should be organized according to room and surface orientation. The organization system should be consistent throughout the project to enable comparison between before and after images.

- *Installation of crack monitors*
  Where cracks currently exist and appear to be actively moving, installation of crack monitors during pre-construction is recommended as a means to establish trends in movement prior to any construction activity. Once a baseline has been established, the monitors should be left in place and recorded at regular intervals over the course of construction. The relatively low cost and disposable nature of crack monitors makes them an economical way to track building movement over time.

5.1.3 Public Outreach & Education

One of the most important pre-construction recommendations is community outreach and education. The vibrations levels needed to cause aesthetic damage are higher than those commonly detected by people. Therefore, people are going to be well aware of the construction-generated vibrations, making them hyper-vigilant about any changes to their building. Communication regarding what types of construction are proposed, what levels of vibrations they will likely experience, and for how long is important when striving to maintain positive pubic perception. The City of Marysville has earned a reputation for good public outreach. This should be used to the project sponsor's advantage through the following actions:

- *Public notification letters*
  All residents, owners, and business proprietors within 200-feet of the construction zone, and along all proposed haul routes, should be sent a letter that outlines the nature of the proposed construction, the approximate dates of construction, anticipated vibrations and other impacts (increased traffic, dirt and debris hauling, etc.) that may be experienced by these residents. Clearly communicated methods to report damage, file complaints, get more information, or otherwise engage the project sponsor should be provided. At a minimum, Garavaglia Architecture, Inc. recommends a dedicated hotline and monitored website to allow for two-way communication regarding construction activities.

- *Public meetings*
  A series of public forums should be scheduled to allow for direct dissemination of project-related information prior to the start of any construction in the area. At a minimum, the information in the notification letter should be presented and expanded upon. Adequate time for questions and answers should be accommodated. All questions and answers should then be posted online, or sent to interested parties.

- *Dissemination of educational materials*
  As an added measure of good will and preparedness, the project sponsor should prepare a set of guidelines for residents to follow lessen chances of indirect damage, from falling items, improperly braced furniture, or other conditions that are outside the control of the project sponsor. At a minimum horizontal storage of fragile items should be encouraged. These recommendations would include movement of fragile items from high shelves to low, of attaching shelving to the wall, securely anchoring items hung on walls, and other methods to address decorating choices that could be impacted by construction vibration.

  At a minimum, information should be readily available in print form at the public library, at City Hall and the local Post Office. If possible, a website should be established with public information such as these guidelines, project updates, photos, and a monitored method for registering comments or complaints.

5.1.4 Stabilizing 226 First Street

Even though the anticipated vibrations levels are below levels that are likely to cause damage, pre-construction installation of bracing to support the front facade, rear parapet, and the walls of the accessory building shell at the rear of 226 First Street is recommended.

- *Front facade*
  The front facade needs to be anchored back into the roofline to prevent complete separation. This can be accomplished using all-thread rod or cable through the masonry with a positive attachment to the existing roof framing. The attachment should be located approximately 8'-0" into the roof, behind the wall. Work should be detailed by a

structural engineer familiar with the Secretary of the Interior's Standards and qualified to work with archaic masonry construction.

- *Rear wall parapet*
  The rear wall needs to be anchored into the roofline to prevent complete separation. This can be accomplished using all-thread rod or cable through the masonry with a positive attachment to the existing main roof framing. The attachment should be located approximately 8'-0" into the roof, in front of the wall. Work should be detailed by a structural engineer familiar with the Secretary of the Interior's Standards and qualified to work with archaic masonry construction.

- *Accessory building walls*
  Each of the four freestanding walls of this building should be braced. The simplest way would be to place a single concrete deadman in the middle of the four walls and attach a single standard tilt-up panel brace to each wall at the centerline and down to the deadman.

Each of these temporary bracing elements should be designed to be reversible with minimal attachments and be designed to be compliant with the Secretary of the Interior's Standards and Guidelines for the Treatment of Historic Properties.

5.2 DURING CONSTRUCTION

5.2.1 Monitoring Plan

The anticipated vibrations levels for the proposed construction methods within the APE are below the generally accepted thresholds above which damage would be likely. Therefore, the construction methodology is unlikely to cause damage within the historic district. The recommendation is to monitor vibrations levels at the buildings and regularly inspect the buildings for damage during periods of construction in the immediate vicinity.

Buildings of concern and vibration limits
The listed properties are historic, fragile structures and the specified vibration limits are lower than those typically specified on similar construction projects. The information from vibration monitoring is used to help control the level of construction vibrations the properties will experience during construction activities. Most of the buildings are in fair to good condition, are occupied on a daily basis, and have some level of seismic strengthening. However because there are several buildings that are in poor condition, a worst-case approach is recommended to establish a baseline vibrations threshold for the entire district. Therefore, for the buildings in question, a vibrations limit of 0.08 in/sec is recommended. This level is the minimum vibrations level recommended by Caltrans, and is still below many international vibrations standards. This value is also below that generally required to cause damage to finishes in historic buildings.

Instrument and operator specifications
Monitoring equipment can be very helpful, but only if installed and used by qualified and trained personnel. These qualifications and specifications will be further developed during the design phase along with specific installation and monitoring guidelines. Base recommended requirements are:

- The vibration monitoring equipment should conform to the *Performance Specifications For Blasting Seismographs*, 2011 edition, issued by the International Society of Explosive Engineers (ISEE).[38]

- The installation of the monitoring equipment should conform to Part II, Sections A and B of the *Field Practice Guidelines For Blasting Seismographs*, 2009 edition, issued by the International Society of Explosive Engineers (ISEE).[39]

- Integral, three-axis geophones are recommended for project. All three axes should be monitored. Noise monitoring may be desired, but is not needed as part of the vibrations monitoring protocols. Microphones do not have to be installed.

- The vibration data should be recorded, stored, and analyzed digitally. Analog (paper) on-site printouts are not recommended because of their fragility and lack of reliable backup recordation systems.

- Waveform recording mode is acceptable. Cell modem instrument communications are also viable solutions. The operator would be responsible for confirmation of adequate cell coverage. On-site, 110-volt power may not be available at all lots and arrangements may be necessary to draw power from adjacent lots.

- At the time of measurement the vibration monitoring equipment should have a current, valid calibration certificate.

- The operator should responsible for the maintenance and security of their equipment. The project Contractor should not be responsible for damaged or stolen instruments unless an instrument is directly damaged by Contractor activities. The operator should inform the Contractor and project sponsor of the location of the instruments via written documentation.

- The installation, operation, and analysis of the vibration monitoring instruments should be performed under the supervision of a Registered Civil Engineer, Geophysicist, or Geologist in the State of California who has at least five (5) years of experience and who has expertise in the field of vibration monitoring that includes instrument set up, data processing, and data interpretation (hereinafter referred to as the Instrumentation Professional). A technician under the supervision of the Instrumentation Professional may conduct the actual measurements. Further definition of "expertise" will be included in the specifications developed during the design phase for the project.

- Vibration-monitoring personnel, which include those persons, firms, or entities providing vibration monitoring, recording, documentation and the production of reports, should also have the qualifications specified above. The selected vibrations-monitoring contractor should be independent and should be neither employed nor compensated by subcontractors, or by persons or entities hired by subcontractors, who

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[38] International Society of Explosive Engineers, "*Performance Specifications For Blasting Seismograph*," (ISEE, 2011).
[39] International Society of Explosive Engineers, "*Field Practice Guidelines For Blasting Seismographs*," (ISEE, 2009), 2-4; The referenced documents are for blasting, but the same instruments are used to monitor construction vibrations. The installation methodologies are the same regardless of the vibration-generation source.

will provide other services or material for the Project. Monitoring personnel must be impartial to the outcomes of the monitoring and this neutrality should be readily verifiable.

Monitoring operations
Implementation of monitoring activities should follow a clear, logical plan. All parties involved should be aware of the plan including location of monitoring equipment and frequency of on-site monitoring equipment inspections or readings. To this end, the following are recommendations to guide development and implementation of such a plan:

- Prior to performing any vibration monitoring, including baseline vibration monitoring, the Contractor shall submit to the Engineer a written plan detailing the procedures for vibration monitoring. The plan shall include (but not be limited to) the following:

    - The name of the firm providing the vibration monitoring services.
    - Description of the instrumentation and equipment to be used.
    - The proposed location(s) for the instruments.
    - Methods for fixing the geophones to the ground or building.
    - Data collection/analysis methods and procedures.
    - The number of vibration monitors to be used on this project.
    - Means and methods for providing warning when particle velocity exceeds specified limits.
    - Name of the responsible person(s) designated by the Contractor that can stop vibration-producing work (as necessary).
    - A contingency plan for alternative construction methods if the particle velocity exceeds the specified vibration limits.

- Pre-construction vibration levels (baseline monitoring) shall be monitored for three (3) weeks prior to construction activity occurring within 500-feet of the subject properties. Monitoring shall occur from 6 am to 9 pm, seven days a week during this time period. Monitoring equipment should be placed to monitor street traffic vibration levels. After completion of the baseline monitoring, the Contractor shall submit a report of findings to the Engineer in a timely manner.

    Based on the results of this baseline monitoring, additional pre-construction stabilization measures may be considered.

- If possible, monitoring equipment should be placed within 2-feet of the building foundations on the side facing the Contractor's work site (south or rear for most buildings). Monitoring equipment can be placed either outside the perimeter foundation or in a crawlspace/ basement. For buildings whose construction-site frontage exceeds 200-feet, at least 2 monitors shall be utilized at that location. If construction within the 200-foot area occurs for one year or longer, provisions should be made to allow switching out individual instruments for yearly calibration without loss of monitoring coverage. Inoperative, damaged, and/or stolen instruments shall be replaced in a timely manner.

- The vibration monitoring equipment shall be in place and functioning properly prior to any construction activity within 200-feet of the listed properties or for work at greater distances as determined by the Engineer. No construction activity shall occur within this 200-foot zone unless the vibration monitoring equipment is active and functioning properly. The instruments should be on and recording between the hours of 7 am to 5 pm, or at least 30-minutes before and after daily construction hours, whenever construction activities occur within the 200-foot zone.

- During construction monitoring, the Contractor should submit daily reports within 1-hour of cessation of construction activities to the Engineer documenting the results of the vibration monitoring.

- All vibration monitoring reports should be reviewed and signed by the Instrumentation Professional. At a minimum, these reports should include:

    - Project identification, location, project name, date, name of individual responsible for monitoring, name of individual who prepared report, and monitoring results with conclusions.
    - Location of monitoring equipment, including the address of the monitored building or facility.
    - Description and location of vibration source(s).
    - If thresholds are exceeded, a description of any resulting damage and the actions taken to address the cause and damage, should also be included in the monitoring report.

- The vibration monitoring equipment shall be set up in a manner such that an immediate warning is given when a vertical peak velocity equal to or exceeding 0.08 in/sec is produced. The warning emitted by the vibration monitoring equipment should be instantaneously transmitted to the responsible person designated by the Contractor by means of warning lights, audible sounds, or electronic transmission. Notification to a cell phone, beeper, or other personal communication device is recommended. The responsible person shall have the authority to stop the work causing the vibrations. The Contractor should notify the Engineer every time the vibration exceeds the vibration limit.

- Further development of security procedures and qualifications for personnel will be included during the design phase for the project.

Out of Plane Monitoring
226 First Street has two areas of concern that require additional monitoring. The front wall of this building has noticeable separation from the sidewalls. In addition to preliminary bracing of this wall during pre-construction activities, biaxial tilt monitoring is recommended. The monitoring equipment should be installed at the top of the wall, at the northeast corner where maximum displacement is likely. It should be monitored continuously and should use a warning system similar to the vibration monitors. Warnings should be sent when displacement exceeds 1-degree from existing. This should be accompanied by cessation of all construction activities until the wall is supported with supplemental bracing, or repaired in a manner to limit further displacement.

At the rear of this property is a brick building shell. In addition to pre-construction bracing, biaxial tilt monitors should be installed at the top corners of each wall, for a total of eight (8) monitors. It should be monitored continuously and should use a warning system similar to the vibration monitors. Warnings should be sent when displacement exceeds 1-degree from existing. This should be accompanied by cessation of all construction activities until the wall is supported with supplemental bracing, or repaired in a manner to limit further displacement.

Access and Security Considerations

The above guidelines assume that monitoring equipment can be placed next to the buildings foundations. If the owners refuse to provide access to their properties, the instruments may have to be set at the property line. Depending on the distance between the property line and the building foundation, this could have a significant effect on Contractor operations. Vibrations readings of 0.1 in/sec at 50-feet from construction activities imply a potentially different set of circumstances than 0.1 in/sec at a building foundation located 100-feet from construction activities. Because the property lines along First Street are much closer to the construction-site than the building foundations, monitors at the property line could potentially record higher vibrations levels than what is actually experienced by the buildings themselves. Outreach to building owners in critical, early in the pre-construction phases, to educate them on the monitors, access frequency, and its impact on safety for their properties. Most buildings are businesses and are occupied during normal work hours. This should enable regular maintenance of the monitors with advanced notification to building tenants and owners.

Locations

For the historic district, monitors should be placed along the rear elevations of the buildings along the south side of First Street. To reiterate, these locations are:

- 226 First Street
- 228 First Street
- 230 First Street
- 232 First Street
- 310/310 ½ First Street
- 312/312 ½ First Street
- 320 First Street
- 322 First Street
- 324 First Street
- 330 First Street
- 7 D Street

One instrument should be placed immediately north of the Bok Kai Temple, within the rear of the 7 D Street property to monitor vibrations for the temple as well as for 7 D Street, 330, 324, 322, and 320 First Street. If permissible by the owner, this monitor would also serve to record conditions relevant to the Bok Kai Temple. A second monitor should be placed at the rear of 312 First Street to monitor vibrations near 310 and 312 First Street. At the far eastern end of the district, a vibrations monitor should be placed inside the burned brick shell behind 226 First Street. Two more monitors should be placed at the southwest corner of 232 First Street and at the southeast corner of 226 First Street.

For the Historic District, that is a recommended total of five monitors. Depending on how construction activities are organized, some of the instruments at the east end of the site could be shifted west as construction progresses

Maintenance

Remote access to the monitoring equipment is recommended. This is most cost effective if 110-volt power can be provided on a continuous basis. If a live power feed is not available, there is a reliance on battery-supplied power. Typically, an instrument can stay in the field for six (6) days before it has to be recharged. Depending on the installation, this would require replacement of the external batteries or removal for overnight recharging an average of once a week. This would require site visits at a minimum frequency of once a week. If a direct power source is available, the number of site visits can be reduced to once every four (4) to six (6) weeks. Batteries can be recharged with solar cells, but this greatly complicates secure installation and makes the units greater targets for theft. Secure installations can be done, but the associated costs are higher. An alternative to regular site visits to maintain the equipment is to train a Contractor technician to download the data from the instruments and change the batteries or charge the instruments as needed.

5.2.2 Regular Field Inspections

Remote monitoring of vibrations levels will not necessarily indicate the existing conditions at the site. To avoid causing unnecessary damage, a regular inspection routine is recommended. This is a quick visual survey of focused areas where the most sensitive historical resources are located. A standard methodology, perhaps a checklist, should be developed to guide these inspections and provide for consistency across the project's duration.

- The contributing historic district buildings on the south side of First Street should be inspected weekly, either at the end of the construction shift, or just before it, during construction on the Phase 2B segment. Any changes in condition should be immediately reported. Depending on the nature of damage, steps should be taken to temporarily halt any ongoing construction until a remedy is implemented.

- When a monitoring station in the area records a PPV above the recommended vibrations threshold of 0.08 in/sec, a complete visual inspection of the subject buildings should be completed. The pre-construction documentation should be used as a base to record any additional conditions discovered during this inspection.

- If a crack monitor on a building registers movement of 1/32-inch or ½-millimeter, a complete visual inspection the interior and exteriors of that building should be completed. The pre-construction documentation should be used as a base to record any additional conditions discovered during this inspection.

5.2.3 Equipment Protections

The southern section of the Downtown Marysville Historic Commercial District located immediately adjacent to the portions of existing levee. The proposed staging site is immediately adjacent to the most fragile of these buildings. Currently, chain link fence surrounds these buildings. Additional measures should be installed to prevent errant materials and equipment from contacting the buildings near the staging site. Any fencing or barricades should be reversible and temporary while still providing adequate protection for the resources nearby.

5.2.4 Dust & Debris Control

Barriers to prevent debris from striking the buildings should be put in place prior to the start of construction. In addition, a dust mitigation plan should be created to limit dissemination of airborne particles into interior spaces of the businesses and offices housed within the buildings The nature of the barriers should be determined once the exact scope of construction activities and methodologies in the area has been finalized since barrier protection should be based on potential hazards. No barriers should be directly attached to the buildings or situated as to cause damage to the building.

5.3 POST-CONSTRUCTION

5.3.1 Establishing Baseline Building Conditions

Understanding the difference between current conditions and those recorded prior to the start of construction is necessary to understanding the nature of any potential construction-related deterioration. As a means to protect the project sponsors from unsubstantiated claims of damage, a post-construction existing building conditions should be recorded after completion of construction. Depending on the resource and access to the various elevations and spaces for each building, different methodologies can be employed.

- *3D laser scans or photogrammetry*
  These methods are most appropriate for building exteriors or for spaces that are large enough to allow for entire walls to fit within a single view. Laser scans are the most common method for this type of recordation. It is fast and relatively cost effective. Multiple scans can be done in a single day with processing of the raw data completed over a period of several weeks. It is possible to collect the data and process it at a later date on an as-needed basis. In general, resolution and accuracy vary. Determination of the most appropriate equipment should be done in consultation with a trained operator who is experienced with scanning architectural subjects in the field.

  This method is recommended for relatively flat building surfaces where the view is straight on. For the most of the buildings on the south side of First Street, this technology can be used for the primary elevation at a minimum. Because of the number of empty lots, some buildings will be able to have up to three sides recorded in this manner.

- *Systematic recordation with high resolution digital photographs*
  As an alternate to laser scanning, thorough recordation of all surfaces with a digital camera can be used to establish a visible baseline of conditions. This method is relatively quick and inexpensive although it won't be able to record hairline cracks with much precision and differences in rough surfaces, such as a sandblasted brick wall, may be difficult to discern. This method is best used in combination with a hand-recorded survey on interior elevation drawings. For all of the subject buildings in the historic district, interior and exterior elevation drawings would need to be created to enable accurate recordation of surface cracks and other existing conditions.

  Photographs should be organized according to room and surface orientation. The organization system should be consistent throughout the project to enable comparison between before and after images.

- *Installation of crack monitors*

Inexpensive and effective, crack monitors can be installed in sensitive locations with no impact on the historic resource and very little visual impact for tenants and building owners. They will require regular on-site monitoring. This will provide for quantitative measurement of building movement but may not necessarily indicate movement from construction. Comparison with construction activities and other signs of potential damage should be made to more accurately determine the cause for movement of measured cracks.

The collected information can then be directly compared to the pre-construction conditions records to determine any changes since the start of construction activities. Any changes must then be evaluated to more precisely determine the cause of damage and to establish if damage can be directly attributed to construction, or if it is the result of inevitable wear from poor conditions already present prior to construction.

5.4 MITIGATIONS

While no construction-related impacts are anticipated as a result of the projected vibrations levels, certain mitigation measures may be necessary if conditions worsen at any of the subject buildings. Proposed mitigations range from temporary solutions to brace walls, to permanent solutions that improve the overall stability of the buildings.

5.4.1 Masonry Repointing

Mortar joints throughout the historic district are relatively soft and deteriorated. This weakens the overall wall matrix through a lack of bond between the individual masonry units. Prolonged exposure to vibrations may dislodge poor mortar. This will be indicated along the base of masonry walls by visible quantities of sand, or red-tinted dust. While some dust is frequent in most of the building interiors, the condition could be made worse through construction-related vibrations. Where building interiors are sealed or covered, or where building exteriors are covered with stucco, these conditions may not be readily visible or detectable even through non-destructive means.

The only repair for this condition is to repoint the wall. Replacement mortar should match the original to the greatest degree possible. This may mean using a mortar mix that has a high lime content and little-to-no cement. Using a mortar that is too hard will further weaken the wall by destroying the brick units. A proper mortar mix can be determined through testing samples of the exiting mortar according to the provisions of ASTM 1324. Once a proper mix is determined, the walls should be pointed by a skilled mason who is familiar with working with archaic masonry construction.

Construction can continue during this process provided no brick units are dislodging and no additional cracking of the walls is observed.

5.4.2 Unit Replacement

As noted elsewhere in this report, the quality of masonry throughout the district varies widely. In most exterior walls, sound units are next to failed and the poor units are randomly distributed throughout the wall. Some deterioration is the result of poorly executed previous repairs. Some is the result of moisture trapped in the wall from non-functioning site and building drainage systems. As a result of poor materials, and missing mortar, there are areas where individual units are quite loose and may become dislodged as a result of prolonged exposure to low-level vibrations.

If units become dislodged, construction within 200-feet of the affected building should stop immediately. An assessment of the causes of falling material should be made immediately to determine if the incident was an individual occurrence or if it is part of a larger eminent failure. If the wall is unstable, measures to stabilize the wall should be made prior to repair of the missing unit.

Once the causes for dislodging are determined and mitigated, replacement of the unit should be made with mortar that is compatible with the historic materials. Units should be of similar size, coloring, and strength, and should have similar surface textures and characteristics as surrounding units. Use of salvaged brick is acceptable if it is still in serviceable condition and meets the aforementioned criteria.

5.4.3 Wall Bracing

If walls, wall sections, or parapets begin to tilt out-of-plane, all construction within 200-feet of the affected building should stop and the walls should be braced immediately. A temporary solution for bracing small areas such as parapets is to install 2x6 or larger lumber across the area to distribute the load of the failing area throughout a larger region. Diagonal braces should then be installed against the horizontal members at regular intervals. The spacing and number of braces should be determined by a structural engineer and should be based on the degree of failure and condition of the surrounding walls.

For larger areas, immediate installation of positive connections to roof or floor diaphragms may be needed. In these cases, a qualified structural engineer should be consulted immediately to prevent catastrophic damage. All wall bracing should be designed to be compliant with the Secretary of the Interior's Standards.

6. SUMMARY

The Marysville Historic Commercial District is significant as a representative of the success and importance of the area during the California Gold Rush and throughout the next century. As a hub of regional commerce well into the 20th century, it has a wealth of architectural styles that span the built history of modern California. Those buildings along First Street are particularly significant for their association with one of the state's earliest and largest 19th century Chinese communities. Sensitivity to these features is a critical part of designing a project that complies with Section 106 and CEQA.

As proposed, the construction methods anticipated for completion of the Phase 2B section of the Marysville Ring Levee project will not pose a significant risk to the Marysville Historic Commercial District or to other historic resources in the area. To help limit any potential impacts, limited recommendations for documentation and monitoring should be implemented. These include:

- Bracing of 226 First Street and the accessory structure on this property
- Establishing baseline conditions through laser scanning or digital photogrammetry
- Implementation of a comprehensive vibrations monitoring plan
- Installation and monitoring of crack monitors
- Installation of debris, equipment, and dust barriers
- Public outreach
- Post-construction affirmation of building conditions through re-surveying (laser scanning or digital photogrammetry)

Vibration will occur at levels detectable by humans but should remain well below the levels generally required to cause aesthetic damage. Structural damage is highly unlikely based on the current analysis. Provided limited pre-construction stabilization measures are implemented, vibrations levels remain under the recommended threshold of 0.08 in/sec, and the project is properly monitored to verify that levels remain below this threshold, impacts to the historic resources are highly unlikely.

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8. PROFESSIONAL QUALIFICATIONS

Garavaglia Architecture, Inc. is a full service architecture firm located in San Francisco, specializing in providing historic preservation architecture and planning services. Founded in 1986, we have worked with Federal, State and local clients for over 25 years. We have a wide range of professional experience with the Secretary of the Interior's Standards and Guidelines for the Treatment of Historic Properties, NEPA, CEQA, and Section 106 compliance, and application of the California Building Code, California Historical Building Code, energy codes, and accessibility regulations (including ADA) to a variety of building and structure types. The firm has an in-house staff of architects, historians, and building conservation professionals who exceed the Professional Qualifications Standards used by the National Park Service, previously published in the Code of Federal Regulations, 36 CFR Part 61 in either Historic Architecture or Architectural History.

APPENDIX A: FIRST STREET BUILDING SUMMARIES

228 FIRST STREET

Date of Construction:
1858/1913

Historic Name/Use:
n/a

Current Name/Use:
Kim Wing Building/Vacant

Historical Notes:
The National Register nomination indicates the second floor was added and the façade remodeled in 1913.

Observed Construction:

- Walls
  - Exposed brick (front)
  - Stuccoed brick (east and south)
- Floors
  - Wood framed
- Roof
  - n/a
- Foundation
  - n/a
- Seismic or other strengthening
  - No seismic retrofit work apparent.
- Other
  - Tall parapet is not braced
  - Appears to share a party wall with 230 First Street

Observed Conditions: The building has been vacant for some time. A second story rear porch and a first floor shed-roof addition have been removed. Cracks are visible in the stucco on the east elevation Most windows are missing and/or boarded up. The wood storefront is heavily damaged.

Recommendations:

- Install crack monitors on west elevation
- Visually monitor façade for falling materials
- Electronically monitor for vibration levels

230 FIRST STREET

Date of Construction:
1860

Historic Name/Use:
n/a

Current Name/Use:
Vacant

Historical Notes:
The National Register nomination indicates the second floor was added at an unknown date.

Observed Construction:
- Walls
  - Exposed brick
- Floors
  - Wood framed
- Roof
  - n/a
- Foundation
  - n/a
- Seismic or other strengthening
  - No seismic retrofit work apparent.
- Other
  - Parapet is not braced

Observed Conditions: The building has been vacant for some time. Water damage is evident on the interior as viewed through the damaged storefront. Partial collapse of the second floor has occurred and the storefront windows are falling inward. Window openings at the rear are covered with corrugated metal sheeting. All this damage suggests the roof is severely damaged as well.

Recommendations:
- Visually monitor building for additional falling materials
- Electronically monitor for vibration levels

232 FIRST STREET

Date of Construction:
1858

Historic Name/Use:
n/a

Current Name/Use:
Chinese American Museum

Historical Notes:
National Register nomination indicates second floor added c.1925. C St. façade had additional windows, all topped with arched headers. A central door or window appears to have been removed on the 2nd floor front elevation.

Observed Construction:

- Walls
  - Stuccoed brick with murals
  - Wood and exposed brick strorefront
- Floors
  - Wood framed
- Roof
  - n/a
- Foundation
  - n/a
- Seismic or other strengthening
  - Minimal bolting (note stars in the above image) at the second floor level noted
- Other
  - 1st floor museum, 2nd fl apartment and meeting room
  - settlement noted on 2nd floor at NW corner

Observed Conditions: This building originally fronted both First and C Streets. It has a first floor with a number of tall, arched openings along the first floor facing C Street. Cracks are visible in the stucco where these arched openings have been filled in. This building is reportedly open on a limited basis. The stucco on the rear elevation is failing at the ground floor level. A large blue tarp is covering the rear of the east wall where a second floor addition to the neighboring building has been removed. The parapet appears to be unbraced. Numerous items are loosely attached to the walls on the 1st fl.

Recommendations:

- Install crack monitors on west elevation
- Visually monitor façade for falling materials
- Electronically monitor for vibration levels

310-312 FIRST STREET

Date of Construction:
c.1860

Historic Name/Use:
n/a

Current Name/Use:
Offices

Historical Notes:
These two separate buildings were constructed about the same time. They have been altered to their current appearance at an unknown date.

Observed Construction:

- Walls
  - Exposed brick walls (front and west)
  - Sanded stucco finish on brick walls (east)
- Floors
  - Wood framed (suspected)
- Roof
  - n/a
- Foundation
  - n/a
- Seismic or other strengthening
  - No seismic retrofit work apparent.
- Other
  - Parapet bracing is unknown.
  - Interior brick sealed
  - Thru-wall crack on west wall

Observed Conditions: These buildings were originally flanked by other brick structures and shared a party wall. Brick ledgers to support second floor joists are visible. The east side of the pair has been stuccoed. This stucco is delaminated along the entire eastern façade. The west side has had multiple repairs executed with modern infill brick units. Failure of the historic brick surrounds these repairs. Bricks are severely damaged. A full height crack is located along the northern 1/3 of the west elevation. Brick dust noted on interior. 210 ½ used as private residence.

Recommendations:

- Install crack monitors on west elevation
- Visually monitor façade for falling materials
- Electronically monitor for vibration levels

320 FIRST STREET

Date of Construction:
1860

Historic Name/Use:
Davis Hotel

Current Name/Use:
Retail/Offices

Historical Notes:
Originally housed retail and residential uses. Became an infamous brothel that operated up to the 1960s. National Register nomination notes the storefront was first altered c.1900. The current storefront is much more recent.

Observed Construction:

- Walls
  - Exposed brick walls (front)
  - Rough stucco finish on brick walls (side)
- Floors
  - Wood framed (suspected)
- Roof
  - n/a
- Foundation
  - n/a
- Seismic or other strengthening
  - Minimal bolting at the second floor level noted
  - Does not meet current codes
- Other
  - No parapet bracing
  - Seismic retrofit in 1980s
  - Back section is 8-10" below grade
  - Openings in party wall infilled – former exterior wall
  - Floor slopes toward rear
  - Roof drains may not be functioning

Observed Conditions: The exterior walls have been heavily sandblasted and are in poor condition. In some location the former stucco façade appears to have been manually chipped off the brick surface. The mortar is deteriorated and loose brick units were observed, especially at the parapet. First floor largely vacant.

Recommendations:

- Visually monitor façade for falling materials
- Electronically monitor for vibration levels

322 First Street

Date of Construction:
Post-1860

Historic Name:
n/a

Current Name/Use:
Offices

Historical Notes:
The National Register nominations notes this building originally contained a mix of retail and residential uses. It also functioned as an annex to a brothel located next door at 320 First Street.

Observed Construction:

- Walls
  - Exterior brick walls
- Floors
  - Wood framed (suspected)
- Roof
  - n/a
- Foundation
  - n/a
- Seismic or other strengthening
  - No seismic retrofit work apparent.
- Other
  - Parapet bracing is unknown
  - Arched windows filled in
  - CMU rear wall
  - 2 party walls – appears building was an infill between neighboring structures

Observed Conditions: The brick is heavily sandblasted. Remnants of previous signage are embedded in the walls. Water staining noted at ceiling on interior. Brick dust on interior

Recommendations:

- Electronically monitor for vibrations levels

324 First Street

Date of Construction:
1858

Historic Name:
Senator Hotel

Current Name/Use:
Offices

Historical Notes:
Building altered in 1980 to its current appearance. The 1999 district National Register nomination lists the building as too altered and designated it a non-contributing structure within the historic district.

Observed Construction:

- Walls
  - Exterior brick walls furred out
  - Finished with modern brick
  - Central masonry partition wall
- Floors
  - Wood frame
  - Partial mezzanine level
- Roof
  - n/a
- Foundation
  - n/a
- Seismic or other strengthening
  - No seismic retrofit work apparent.
- Other
  - Original first floor was cast iron storefront
  - Only columns remain
  - Front elevation finished in stucco c.1920s, likely sandblasted since

Observed Conditions: Exterior surfaces incorporate a limited number of original elements – terra cotta cornice panels and cast iron storefront columns. The arches were an original design element that has been recreated in the new, c.1980 façade. No material or structural problems were noted on the exposed exterior surfaces. 2nd fl. unfinished and under construction.

Recommendations:

- Electronically monitor for vibrations levels

330 FIRST STREET

Date of Construction:
c.1854

Historic Name:
n/a

Current Name/Use:
Silver Dollar Saloon

Historical Notes:
The Silver Dollar Saloon was established by Robert Nicoletti in 1979. The current owner could provide no further historical or construction related information. Façade unchanged since 1999.

Observed Construction:

- Walls
  - Interior and exterior walls furred out
  - Finished with modern materials
  - Brick construction
- Floors
  - Wood finish on wood framing
- Roof
  - Hip
  - Wood framed
- Foundation
  - No basement (according to owner information). Access was allowed to the first floor dining area only.
- Seismic or other strengthening
  - No seismic retrofit work apparent.
- Other
  - n/a

Observed Conditions: Walls covered and conditions could not be directly observed. No obvious signs of material or structural failure were apparent. The interior space is heavily decorated with items hanging on the walls and from the ceiling. Falling materials may be of concern. Water damage apparent at southeast corner of 2nd fl. Minor plaster delamination and cracking on 2nd fl.

Recommendations:

- Secure loose items to the walls
- Electronically monitor for vibrations levels

7 D STREET

Date of Construction:
c.1856

Historic Name:
Private residence

Current Name/Use:
Private residence

Historical Notes:
Reportedly built for a Chinese doctor. Been in current owner's family c.40 years

Observed Construction:

- Walls
  - Brick masonry
  - Plaster finish on interior
- Floors
  - Wood finish on wood framing, carpet
- Roof
  - Replaced c.2005
- Foundation
  - none observed
- Seismic or other strengthening
  - No seismic retrofit work apparent.
- Other
  - Minor interior plaster cracking, mostly original trim and details
  - Brick sandblasted

Observed Conditions: Excellent condition given age and location. It has been well maintained with no apparent conditions issues apart from minor cracking and a previous leak in the stacked bathroom areas.

Recommendations:

- Electronically monitor for vibrations levels

APPENDIX B: 1999 NATIONAL REGISTER DISTRICT NOMINATION

RREVIEW AND COMMENT REPORT
BY
CERTIFIED LOCAL GOVERNMENT

CHIEF LOCAL ELECTED OFFICIAL

ON AN
APPLICATION FOR LISTING ON THE NATIONAL REGISTER OF HISTORIC PLACES

Property Name: Marysville Historic Commercial District

Name of Certified Local Government: City of Marysville

Category of Significance:

______ Architecture   x History   ______ Archeology
______ Other ______

x The City Council recommends the nomination of this property be listed on the National Register of Historic Places, with the following comments:

The Marysville Historic Commercial District is signficant historically for the role it played in the commercial development of the City. It maintains its association with the City's commercial development from the 1850's to 1940's. No other area of the City is nearly as important in commerce during this period.

______ The City Council does not recommend this property for nomination to the National Register of Historic Places for the following reasons:

____
Signature of Chief Local Elected Official
Jerome Crippen, Mayor

January 5, 1999
Date

NPS Form 10-900
(Rev. 10-90)

OMB No. 1024-0018

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES REGISTRATION FORM

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in How to Complete the National Register of Historic Places Registration Form (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name: Marysville Historic Commercial District

other name/site number: ______

2. Location

street & number: Parts of fourteen blocks bounded by First, Sixth, C, and E Streets

not for publication: N/A

city/town: Marysville vicinity: _

state: California code: CA

county: Yuba code: 115 zip code: 95901

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1986, as amended, I hereby certify that this ____ nomination ____ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ____meets ____ does not meet the National Register Criteria. I recommend that this property be considered significant ___ nationally ___ statewide ___ locally. (___ See continuation sheet for additional comments.)

Signature of certifying official Date

State or Federal agency and bureau

In my opinion, the property ____ meets ____ does not meet the National Register criteria. (___ See continuation sheet for additional comments.)

Signature of commenting or other official Date

State or Federal agency and bureau

4. National Park Service Certification

I, hereby certify that this property is:

____ entered in the National Register
___ See continuation sheet.
____ determined eligible for the National Register
___ See continuation sheet.
____ determined not eligible for the Natonal Register

____ removed from the National Register

____ other (explain): ________________________

Signature of Keeper — Date of Action

5. Classification

Ownership of Property (Check as many boxes as apply)

- X private
- X public--local
- ___ public--state
- ___ public--Federal

Category of Property (Check only one box)

- ___ building(s)
- X district
- ___ site
- ___ structure
- ___ object

Number of Resources within Property:

Contributing	Noncontributing	
59	26	buildings
0	0	sites
1	0	structures
0	0	objects
60	26	Total

Number of contributing resources previously listed in the National Register: 1

Name of related multiple property listing: N/A

6. Function or Use

Historic Functions (Enter categories from instructions)

Category:		Sub:
	COMMERCE/TRADE	specialty store
	COMMERCE/TRADE	business
	DOMESTIC	hotel

Current Functions (Enter categories from instructions)

Category:		Sub:
	COMMERCE/TRADE	specialty store
	COMMERCE/TRADE	business
	COMMERCE/TRADE	restaurant

7. Description

Architectural Classification (Enter categories from instructions)
Mission/Spanish Colonial Revival
Italianate
Moderne

Materials (Enter categories from instructions)

foundation	concrete
roof	ceramic tile
walls	brick
	stucco
other	

Narrative Description (Describe the historic and current condition of the property on one or more continuation sheets.)

8. Statement of Significance

Applicable National Register Criteria (Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

_X_ A Property is associated with events that have made a significant contribution to the broad patterns of our history.
___ B Property is associated with the lives of persons significant in our past.
___ C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
___ D Property has yielded, or is likely to yield information important in prehistory or history.

Criteria Considerations (Mark "X" in all the boxes that apply.)

___ A owned by a religious institution or used for religious purposes.
___ B removed from its original location.
___ C a birthplace or a grave.
___ D a cemetery.
___ E a reconstructed building, object,or structure.
___ F a commemorative property.
___ G less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance (Enter categories from instructions)
Commerce
Ethnic Heritage: Asian

Period of Significance 1854-1948

Significant Dates N/A

Significant Person (Complete if Criterion B is marked above)
N/A

Cultural Affiliation N/A

Architect/Builder Evans, I. C.

Narrative Statement of Significance (Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

Bibliography (Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):

___ preliminary determination of individual listing (36 CFR 67) has been requested.
___ previously listed in the National Register
___ previously determined eligible by the National Register
___ designated a National Historic Landmark
___ recorded by Historic American Buildings Survey # ________
___ recorded by Historic American Engineering Record # ________

Primary Location of Additional Data:

___ State historic preservation office
___ Other state agency
___ Federal agency
_X_ Local government
___ University
___ Other

Name of Repository: Planning Department

10. Geographical Data

Acreage of Property: approximately 23 acres

UTM References:	Zone	Easting	Northing		Zone	Easting	Northing
1	___	________	________	3	___	________	________
2	___	________	________	4	___	________	________

____ See continuation sheet.

Verbal Boundary Description (Describe the boundaries of the property on a continuation sheet.)

Boundary Justification (Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

Name/Title: Donald S. Napoli

Organization: ________________ Date: August 24, 1998

Street & Number: 1614 26th Street Telephone: (916) 455-4541

City or Town: Sacramento State: CA ZIP: 95816

DESCRIPTION

The Marysville Historic Commercial District gives a strong sense of the city's downtown just after the end of World War II. The district contains 85 buildings and one structure. Most were designed for retail use, though many also contained residential or office units. The district includes 60 elements that contribute to its historic character and 26 that do not contribute. It also contains about twenty vacant parcels. A block-wide swath of new development cuts the district into two discontinuous sections. Even so, the integrity of the district remains high due to the concentration of resources and the size and importance of the contributors.

The district runs north six and a half blocks from the Yuba River levee to Sixth Street. The street grid has a regular pattern and includes north-south alleys on each block. The terrain is flat. Small trees line some of the streets. The two sections of the district are of unequal size. The northern section contains about four times the area and more than twice the number of buildings as the southern section. The northern section centers on two blocks of D Street from Third to Fifth Street. Nearly half the buildings are arrayed along these two blocks. All the rest are on crossing or parallel streets. The southern section extends along First Street from D Street to beyond C Street. Its contributing buildings face one of these three streets. Nearly all the buildings in both sections extend to their lot lines on each side and front the sidewalk directly with no intervening setbacks. Between the sections is an area of recent development, including new buildings, parking lots, and parcels emptied in anticipation of new construction.

Similarity in historic function, uniformity of scale, and consistency of construction material help to define the visual character of the district. Retailing provided the original ground-floor use of nearly 90 percent of the buildings in the district. Their designs, aiming to attract customers on foot, feature storefronts with recessed entrances and flanking display windows. Most of the buildings are small scale. Ninety percent have fewer than three stories, with those with two stories slightly outnumbering those with

OMB No. 1024-0018

one. Only two buildings rise above three stories. The use of brick adds another unifying characteristic to the district. About half the buildings have unfinished brick walls, and another quarter show elements of brick construction, especially flat parapets and recessed openings, even when finished with other materials.

Within the overall uniformity of the district, the individual buildings vary in several respects. They differ in width, from less than 20 feet to as much as 160, and in the number of storefronts on the street elevations. Despite the predominance of brick, about two dozen building use stucco as the primary surfacing material. Detailing on contributing buildings varies from profuse to minimal. The most common motifs on nineteenth-century buildings have classical inspiration and include bracketed cornices, dentil and belt courses, and hooded windows. Twentieth-century buildings often feature elements of the Mediterranean Revival, including ceramic tile roofs or cornices and terra cotta ornament.

The district has examples of several architectural styles. Buildings of the 1850s and 1860s display a subdued classicism sometimes labeled Greek Revival. Later nineteenth-century buildings, notable for arched window and door openings, exemplify the Italianate style. The district also has a couple renditions of the Neo-Classical Revival and one of the Spanish Colonial Revival. As mentioned above, however, the most popular twentieth-century style is the Mediterranean Revival, often embellished with floral Art Deco ornament. The "PWA Moderne" and Streamline Moderne are also represented in the district. Many buildings, especially those with only a single story, have completely functional designs and defy stylistic categorization.

The district changed its appearance between 1854 and 1948. The earliest buildings were merely tents of canvas or other cloth. They were quickly replaced by brick buildings and had probably disappeared by the mid-1850s. The major construction trend was the northward expansion of the commercial area. Early brick buildings were not routinely demolished and replaced. Instead, new buildings usually were constructed on empty or residential lots to the north. By the 1880s the commercial area extended to Fourth Street. By 1930 only a handful of houses stood south of Sixth. The street pattern remained unchanged. The streets themselves were originally dirt and lined by wooden plank sidewalks interspersed with hitching posts. Road paving and concrete sidewalks arrived around 1910. The entire district was paved by 1917. The introduction of electricity around 1900 led to the installation of electric street lamps and a set of electrolier arches over some intersections. In the 1920s businesses added neon signs. The arches were removed by 1948. Another turn-of-the-century change was the installation of streetcar tracks along several blocks of D and Fifth Streets. The district had no landscaping.

The commercial area has changed dramatically in the past fifty years. The number of buildings in the area roughly bounded by First, Sixth, C, and E Streets has dropped by more than half. The main cause was a redevelopment project, begun in 1977, that removed all the buildings on three blocks and replaced them with three large buildings and parking lots. In addition, dozens of nearby buildings, primarily along Second and E Streets, were also demolished and sometimes replaced with smaller structures. In all, about 160 buildings that were adjacent to the present district in 1948 have disappeared in the past 50 years. New construction and facade remodeling on D Street north of Fifth have also reduced the size of the district. Other changes are less important. They include the removal of trolley tracks (ca. 1960), the addition of high light standards (ca. 1965), and the planting of some street trees (ca. 1990). Signage has become more subdued, and most neon signs have disappeared. A replica of an electrolier arch was installed in the 1980s.

The overall ambience of the district has also changed. D Street, the town's bustling commercial strip in 1948, is now largely devoid of customers and foot traffic. E Street, meanwhile, has become a multi-lane funnel, shooting drivers back and forth from suburbs in the south to strip malls in Yuba City to the north. The district, once the home of national chain stores and longtime local merchants, now contains mostly small-scale businesses. Perhaps half the buildings are empty.

Many buildings have undergone alterations over the years. First-story porches, which once covered the sidewalks south of Fourth Street, began to disappear after 1910. Many original storefronts have been modernized. Often this change has involved the use of metal framed windows instead of the original wood, the installation of brick wall facing, and the covering or remodeling of clerestory bands. Also common is the removal of plaster wall surfacing, which may or may not reflect the building's original appearance. This trend began as early as the 1920s and has continued into recent years. As a result, the bricks are sometimes pocked and conspicuously repointed. In addition, the facades of several noncontributors have been completely resurfaced in new brick. By contrast, no building appears to have received its first stucco coat in the past 50 years. As in adjacent areas, the major change to buildings within the district has been their demolition. Thirty-four have gone down since 1948, of which 30 were not replaced by later structures. Most of the demolitions occurred along First and Third Streets.

The district's contributors retain historic materials and design elements above the storefront. Usually these are original, though some represent alterations made before 1948. Contributors are larger and more conspicuous than non-contributors. Of the district's seven buildings that rise over two stories, all contribute to its historic character. Non-contributors are usually old buildings that have suffered severe alterations. Only nine structures in the district date from after World War II. By the same token, nearly all the buildings within the district in 1947 remain today. The major losses are a retail building on Main Street and two automobile facilities on Railroad Avenue.

The district has major contributors distributed throughout. In the southern section, which is distinguished by construction from the 1850s and 1860s, the most conspicuous buildings are much newer. The Tower Theater (103 D Street), notable for its entrance and tower, is the district's most completely executed example of the Streamline Moderne.

OMB No. 1024-0018

The Suey Sing Association (301 First Street) building, with its Chinese design elements, provides a more obvious link to Chinatown than the older structures nearby. On the south edge of the northern section, the Nakagawa building (306 C Street), with its plaster finish and elaborate cornice, shows a typical commercial structure as it had evolved to about 1930. Further north, the Water Company building (329-31 D Street), despite some changes, remains the district's premiere example of the Italianate style. The seven-story Hart Building (421-25 Fourth Street), the district's tallest, presents a large-scale example of the Mediterranean Revival that is already individually listed in the National Register. Another conspicuous product of the building boom of the 1920s is the Hotel Marysville (418-30 Fifth Street), which rises five stories and covers about 40 percent of a city block. Near the north edge of the district is another notable building of the period, the State Theater (515 E Street), an elaborately ornamented example of the Spanish Colonial Revival style.

The boundaries of the district are quite clear. To the south is the Yuba River levee. On the west and in the area separating the two sections of the district is new commercial construction that is set back from the street and fronted by parking lots. In the north newly constructed or remodeled commercial buildings line the 500-block of D Street. Beyond Sixth residences predominate. To the east is an area of mixed uses, including civic and industrial. The boundaries follow contiguous parcel lines. Three buildings, already listed in the National Register but without commercial associations, lie just outside the district. They are the Bok Kai Temple at the foot of D Street, the Packard Library at 301 4th Street, and the Post Office at 407 C Street.

Although Marysville's overall commercial area has lost around 200 buildings in the past 50 years, the district retains a high degree of integrity. Contributing to the feeling of a traditional downtown are the arrangement of the buildings, which are immediately contiguous and front the sidewalk, the predominance of retail uses, the uniformity of scale, and the retention of original design and fabric, especially above the storefronts.

Despite substantial remodeling to several buildings and the demolition of others, the district has maintained its historic character.

Detailed descriptions of the elements in the district follow:

Northern Section

221 -27 Third Street (APN 010 244 021)
Contributing Building, ca. 1915
This wide brick building has two stories. On the front elevation slightly elevated triangular sections mark each end of an otherwise flat parapet. Beneath the parapet is a set of diamond-shaped decorations of lighter brick. Below are seventeen second-story windows, all now boarded. On the left third of the first story is a round-arched entry flanked by square windows. To its right are six large flat-topped openings, now mostly boarded. The building has had a number of uses, including an automobile garage. Some window and door glass may be missing. Otherwise, no alterations are apparent. The building contributes to the historic character of the district.

222 Third Street (APN 010 283 020)
Contributing Building, ca. 1880
This brick building has one story. A flat parapet caps the unornamented front elevation. A plain wall continues the parapet about half way down the facade. There a wide band tops groups of tall single-pane windows in wood architraves and a diagonally recessed entry. The alley (Elm Street) elevation has three multipaned industrial windows, perhaps installed ca. 1925 when the building lost its wood-framed, second-story hay loft. The building was originally a livery stable and later contained a saloon. Despite the new front door and window treatment, the building retains enough of its historic appearance to contribute to the historic character of the district.

305 Third Street (APN 010 242 004)
Noncontributing Building, ca. 1965
This single-story brick building has a flat roof from which an awning projects. Three doors, each flanked by a pair single-pane display windows, line the front elevation. The building was constructed too recently to contribute to the historic character of the district.

313 -15 Third Street (APN 010 242 007)
Noncontributing Building, ca. 1905
This two-story building has a flat roof and stucco finish. Bay windows in a continuous band project from the second story on the front and west elevations. Nearly centered on the front elevation below is a curved, guyed canopy atop a double entrance door with porthole windows. On each side is a long narrow window surrounded by glass bricks set in a wall lined with ceramic tile. On the right is a plain door to the apartments above. The storefront treatment dates from ca. 1949 and may have coincided with the removal of the third story after a serious fire. The building, which has contained rental rooms atop a for at least ninety years, has not changed noticeably since it was modernized. It is too altered to contribute to the historic character of the district.

317 Third Street (APN 010 242 008)
Noncontributing Building, ca. 1960
This single-story building has a flat parapet and brick facing on the front elevation. Three fabric awnings cover five doorways and six interspersed windows. The building was constructed too recently to contribute to the historic character of the district.

411 -13 Third Street (APN 010 233 012)
Contributing Building, ca. 1892
This brick building has two stories and a flat roof. On the front elevation is a flat parapet with projecting cornice supported by curved brackets. Dentiled hoods top the tall second-story windows, which are now boarded. The first story has been modernized,

probably ca. 1955, with a metal awning and a slanted inset storefront with central entry and flanking display windows. The building was part of the Spring Hotel in the 1890s. It retains enough of its historic appearance to contribute to the historic character of the district.

415 Third Street (APN 010 233 013)
Contributing Building, ca. 1856
This brick building, popularly known as Chiseler's Inn, has two stories and a flat roof. Capping the symmetrical front elevation is a cornice defined by a soldier course. Below are three windows. The one in the center contains a vent; the others are boarded. The storefront contains two adjacent doors flanked by display windows and topped by a clerestory band. Most of the windows are now boarded. The entire elevation appears to have received a facelift sometime in the 1940s. The building is much older, having been part of the Spring House hotel in its early years. The first floor contained a popular bar and restaurant and later a separate barber shop. Because it has not been substantially altered in the past fifty years, the building contributes to the historic character of the district.

409 Fourth Street (APN 010 176 007)
Noncontributing Building, ca. 1925
This narrow single-story building is sandwiched between two larger structures. A flat, guyed awning divides the building's front elevation horizontally. Above it is a plain parapet wall. Below is a storefront with central door and flanking display windows, all with aluminum architraves. The entire treatment appears to date from around 1960, so the building does not contribute to the historic character of the district.

410 -14 Fourth Street (APN 010 233 001)
Contributing Building, ca. 1925
This brick building has one story and a flat roof. The front elevation has three vertical divisions. Atop a raised cornice is a parapet with three oblong indentations. Below is a

clerestory band. Each of its three sections contains four multipaned windows. The three storefronts have deeply recessed doors with transoms above and display windows on both sides. No substantial alterations are apparent. The building contributes to the historic character of the district.

413 -15 Fourth Street (APN 010 176 008)
Contributing Building, ca. 1941
This building, originally a bank, has one story and a flat roof. Just below the top of the parapet is a band of decorative panels. The front elevation has three tall, slightly recessed openings, the reveals of which are canted with vertical bands. All are capped with decorative panels and contain multipane windows with a large center pane. The central opening also contains a doorway. A glazed tile kickplate extends across the elevation and around the west side of the building. The Gladding McBean factory in nearby Lincoln supplied many of the decorative features. The front door is not original, but otherwise no alterations are apparent. A clear example of modernistic design, the building contributes to the historic character of the district.

419 Fourth Street (APN 010 176 009)
Contributing Building, ca. 1921
This building has two stories and a stucco finish. Brick trim lines the flat parapet, which is broken on the front elevation by a tiled awning supported by curved brackets. Beneath the awning are two narrow recessed balconies, each with a bracketed flower box in front. To the outside of each balcony is a pair of four-over-one windows topped by a vent. Brick forms the vent, window and balcony surrounds and is used as a belt course atop the first story. Below is a ca. 1960 storefront which has recessed doors and flanking display windows and is topped by a wood awning. The first story originally had a transom band and a porticoed entry on the west. The first floor housed a dry goods store from the early 1920s to 1970. The upper story has always contained apartments. Despite changes to the storefront, the building contributes to the historic character of the district.

OMB No. 1024-0018

421 -25 Fourth Street (APN 010 176 010)
Contributing Building, ca. 1926
This tall concrete office building, the Hart Building, has seven stories and a hipped tile roof. A wide base contains an arched entry flanked on each side by a pair display windows topped by transoms. Ceramic tile forms a "wainscot" along the front wall. Directly above the entry is a wrought iron screen. The shaft above has six sets of multi-paned casement windows, which are separated by plain pilasters on the front elevation. Corner pilasters have banded capitals above the sixth story. Wrought iron railings top the capitals. The building, the district's tallest, has no conspicuous alterations, although the attic now serves as an additional story. It is individually listed in the National Register and contributes to the historic character of the district.

429 Fourth Street (APN 010 176 011)
Noncontributing Building, ca. 1980
This brick building has two stories and a flat roof. A narrow sign board extends from the top of the front elevation. Below are a set of four anodized second-story windows, a fabric awning, and a slightly recessed entry, also of anodized aluminum. The building was constructed too recently to contribute to the historic character of the district.

317 -31 Fifth Street (APN 010 182 006)
Contributing Building, ca. 1902
This apartment building has two stories and a stucco finish. Capping the building is a flat parapet atop projecting eaves supported by exposed purlins. The front elevation has two identical adjacent sections. Each has a wide central doorway topped by a flat, banded awning. The entry contains three doors with glass panels and is approached by a wide stairway. Above on the second story is a Palladian window. On each side of the entry is a bay window that uses glass bricks on the first story and one-over-one sash above. The building may originally have had a Colonial Revival look. The stucco finish, awning, and glass bricks appear to date from a ca. 1940 remodeling. Little has changed since. The building contributes to the historic character of the district.

401 -07 Fifth Street (APN 010 175 006)
Contributing Building, ca. 1867
This building has two stories and a stucco finish. A short, slanted tile parapet caps the building. Below is a simple entablature with small, diamond-shaped decorations in the frieze. Semi-circular bas-relief hoods top the second-story one-over-one windows. First floor storefronts have different configurations. Two include brick wall facing and guyed metal awnings. The half of the building along D Street dates from the nineteenth century. It was remodeled ca. 1920 when the other half was added. Another remodeling ca. 1965 changed the storefronts. The building retains enough of its 1948 appearance to contribute to the historic character of the district.

409 -15 Fifth Street (APN 010 175 016)
Noncontributing Building, ca. 1960
This long, low brick building has a flat roof and four storefronts. Two retain original display windows with brushed aluminum architraves; two have newer brick facades. The building was constructed too recently to contribute to the historic character of the district.

417 -25 Fifth Street (APN 010 175 009)
Contributing Building, ca. 1923
This building, known as the Delta Building, has two stories and a stucco finish. Six pilasters with decorative capitals divide the front elevation into five bays. A curved parapet atop the central bay breaks a plain architrave. Each bay has second-story windows covered by long fabric awnings. A flat, guyed awning extends across the center bay on the first story and tops the entrance. The rest of the ground floor, which originally held storefronts, has been bricked in. Despite this change, the building contributes to the historic character of the district.

OMB No. 1024-0018

418 -30 Fifth Street (APN 010 176 014)
Contributing Building, 1926
This five-story building, the Hotel Marysville, is constructed of reinforced concrete with a brick facing. It has an E-plan above the top story which produces three separated blocks on the front elevation. Each has a raised cornice, a string course near the bottom of the top story, and one-over-one windows, some of which are unglazed. A plain auxiliary cornice tops the first story of the front elevation. Below it is a former transom band, now mostly filled in. The narrow storefronts have different configurations. A flat, guyed awning tops the centered entrance. Despite first story alterations, the building contributes to the historic character of the district.

512 Fifth Street (APN 010 174 015)
Contributing Building, ca. 1930
This building has one story and a stucco finish. Four undecorated, chamfered pilasters divide the front elevation into three bays. Across the elevations is a set of plain, unequally spaced bands. Above the storefront is a series of clerestory windows with triangular panes. Below are display windows in the side bays and a transomed double door and smaller display windows in the central bay. The side (east) door may not be original, but other important alterations are not apparent. The building, which housed a grocery store in the 1930s, contributes to the historic character of the district.

227 C Street (APN 010 283 018)
Contributing Building, ca. 1880
This brick building has one story and a high, double-stepped parapet. Atop the storefront is a fabric awning. Beneath are a set of anodized aluminum windows. The building was first used for vehicle repair; in 1948 it contained a restaurant. The surface may have been stuccoed at some point. The building contributes to the historic character of the district.

229 -31 C Street (APN 010 283 019)
Contributing Building, ca. 1912
This brick building has three stories and a flat roof. The attic story has a simple, slightly projecting cornice. Above the second story is a full entablature without decoration. A similar band tops the first story. Windows on the upper stories use one-over-one aluminum sash. The storefronts on the ground floor have a variety of configurations. A ca. 1948 sign announcing "Travelers Hotel" hangs from the second story at the northwest corner of the building. It may have been moved from the earlier location of the hotel. Despite window and storefront changes, the building contributes to the historic character of the district.

301 C Street (APN 010 244 014)
Noncontributing Building, ca. 1952
This cinder block building has one story topped by a flat parapet of vertical boards. On the front elevation are two doors and three pairs of single-pane windows covered by fabric awnings. All have plain, narrow architraves. The building was constructed too recently to contribute to the historic character of the district.

306 C Street (APN 010 242 003)
Contributing Building, ca. 1857
This brick building, longtime home of the Nakagawa Company, has two stories and a stucco finish. Centered above the cornice is a small pediment that does not extend the width of the building. Indented rectangles decorate the frieze below. On either side of the entablature is a corbel, also with rectangular ornament, that rises above the roof line. Rounded, linked hoods top the segmentally arched windows on the second story. On the ground floor is a display window topped by a transom band and a slightly recessed doorway with paneled door and transom. The doorway originally had a semi-circular arch. The display window may date from ca. 1910. Other alterations are not apparent. The building contributes to the historic character of the district.

308 C Street (APN 010 242 003)
Contributing Building, ca. 1893
This brick building has one story and a flat roof. The symmetrical front elevation has a stucco finish and a slightly recessed entrance with a double door and transom. On each side is a display window. The building has no ornamentation. The present facade treatment appears to date from the 1920s. Some rounded door and window hoods may have been removed lately, but otherwise No recent alterations are apparent. The building contributes to the historic character of the district.

310 -14 D Street (APN 010 233 023)
Noncontributing Building, ca. 1880
This brick building has two stories and a flat roof. An unornamented entablature tops the front elevation. Beneath it is a set of ten small-paned second-story windows. On the ground floor are two differently designed storefronts and an off-center doorway. The entire facade represents a ca. 1975 reconstruction that has removed nearly all the historic fabric from an earlier remodeling in 1929. The building, which once provided offices for some of the city's most prominent lawyers and physicians, is too altered to contribute to the historic character of the district.

311 D Street (APN 010 242 011)
Noncontributing Building, ca. 1893
This brick building has two stories and a flat roof. A flat parapet tops the front elevation, which has recently been reconstructed in weathered brick. The second story has an ornamental brick design but no windows. A fabric awning caps the storefront. The building is too altered to contribute to the historic character of the district.

313 D Street (APN 010 242 012)
Noncontributing Building, ca. 1880
This two-story brick building has received a ca. 1975 facade reconstruction that has obliterated all historic fabric. The front elevation has two large indented squares on the

second story and an awninged storefront on the first. The building, which housed department stores over the years, is too altered to contribute to the historic character of the district.

316 D Street (APN 010 233 024)
Noncontributing Building, ca. 1880
This brick building has one story and a stepped parapet, which is now covered by vines. The storefront has a slightly recessed doorway topped by a transom. On each side are two display windows, which, like the transom, have small panes and wood architraves. The current facade treatment dates from ca. 1975. The building is too altered to contribute to the historic character of the district.

317 D Street (APN 010 242 013)
Contributing Building, ca. 1880
This brick building has two stories and a flat parapet. A band of rounded hoods tops three segmentally arched windows on the second story. The windows are now boarded. Below is a fabric awning. The storefront, which may date from the 1950s, has a deeply recessed door and flanking display windows. Despite the alterations, the building contributes to the historic character of the district.

319 -21 D Street (APN 010 242 014)
Contributing Building, ca. 1886
This brick building has two stories and a plain parapet with a pedimented step in the center. The entablature below has a dentiled cornice and a frieze decorated with small alternating bricks. A band of rounded hoods tops five segmentally arched windows on the second story. The window sash is now covered with boards. Below is a fabric awning. The storefront, which appears to date from the 1970s, has one door on the left and nearly square-shaped display windows. Despite the changes, the building contributes to the historic character of the district.

320 D Street (APN 010 233 006)
Contributing Building, ca. 1884
This brick building has one story and a flat parapet. Below is a fabric awning. The storefront, which has a recessed entry and flanking display windows, appears to date from after World War II. The building contributes to the historic character of the district.

322 -24 D Street (APN 010 233 004 & 005)
Noncontributing Building, ca. 1893
This single-story brick building has two adjacent commercial spaces that now look like two buildings. Each has a flat parapet and a storefront without historic fabric. The one on the left has a slanted wall and display windows with plastic muntin-like strips. The other has a fabric awning and recessed entry. The building is too altered to contribute to the historic character of the district.

323 D Street (APN 010 242 014)
Noncontributing Building, ca. 1880
This brick building has one story and a flat parapet. A fabric awning tops the storefront, which has a recessed entry with two adjacent doors. Display windows flank each door. The building does not exhibit enough historic fabric to contribute to the historic character of the district.

325 D Street (APN 010 242 015)
Contributing Building, ca. 1893
This brick building has one story and a flat parapet with a wide pedimented central step. Below is a dentiled cornice. A fabric awning tops two storefronts, both with centered doors and flanking display windows. Pilasters define the openings on the storefront to the left. The other storefront has been remodeled, perhaps around 1970. Despite the changes, the building contributes to the historic character of the district.

326 -30 D Street (APN 010 233 003)
Contributing Building, ca. 1888
This brick building has two stories, and L-plan, and a flat roof. A narrow band of terra cotta panels decorates the cornice on the front elevation. Larger panels top the three wide second-story window openings. Each opening has three narrow lights on top and three larger lights below. All are now boarded. A fabric awning tops storefront, both of which have recessed entries and flanking display windows. The facade treatment represents a ca. 1925 remodeling. The facade has remained substantially unaltered since. The building has another elevation facing Fourth Street. It has a stucco finish, aplain entablature with end blocks, and three segmentally arched second-story windows within wide molding. An awning tops the storefront. The building contributes to the historic character of the district.

327 -31 D Street (APN 010 242 016)
Contributing Building, 1888
This brick building, originally the home of the Marysville Water Company, has three stories and a flat parapet. Plain pilasters separate the third-story windows, which have semi-circular transoms topped by pronounced keystones. Below a string course are semi-circular arched windows in wide hoods that rest upon pilasters. On the north elevation first floor openings are also arched, and a bracketed canopy tops a centered doorway. A fabric awning tops the two storefronts on the west elevation. Both have been altered with new display windows and brick facing. The building appears to be missing a cornice but has actually lost its fourth story, which was very similar to the second. The fourth story (and earlier the third story) held the water company's three huge tanks. The story was added ca. 1910 and removed ca. 1955. Despite the alteration, the building contributes to the historic character of the district.

332 D Street (APN 010 233 002)
Contributing Building, ca. 1880
This brick building has two stories. Tile coping lines the roof line on both street elevations. Below it are one-over-one windows, which are sided by wood shutters; most are topped by semi-circular hood molding. The first floor has been remodeled using new brick. Despite changes to the storefront, the building contributes to the historic character of the district.

400 -06 D Street (APN 010 176 006)
Noncontributing Building, ca. 1907
This brick building has two stories. A corrugated metal screen, perhaps installed ca. 1965, covers the second story and masks whatever architectural features may be behind it. Below it a band of diagonal boards hides or may have replaced a clerestory band. A flat, guyed awning tops the storefronts, which have different configurations. The building was modernized in the late 1920s, and historic fabric from this remodeling may remain behind the screen. Now, however, the building appears too altered to contribute to the historic character of the district.

401 -05 D Street (APN 010 241 007)
Contributing Building, ca. 1900
This brick building has one story and a flat roof. Tile coping and a thin band mark the roof line. Twin pilasters divide the street elevations into similar bays. All have transoms containing five multipaned windows. Most have display windows and ceramic tile kickplates. Two on Fourth Street have garage doors. One on D has a recessed entrance. The exception to all this is the left section of the front elevation, which is now a plain brick wall with a small doorway. This walled section probably dates from the 1980s. The building as a whole reflects a ca. 1925 renovation and contributes to the historic character of the district.

OMB No. 1024-0018

407 -09 D Street (APN 010 241 008)
Noncontributing Building, ca. 1925
The brick building has one story and a flat parapet with tile coping. Beneath it on the front elevation is a plain wall. Below is a fabric awning. The storefront has a recessed door and a set of display windows, all with brushed aluminum architraves. The facade treatment dates from ca. 1960. The building is too altered to contribute to the historic character of the district.

408 -14 D Street (APN 010 176 005)
Noncontributing Building, ca. 1964
This building has one story and a flat parapet on the front elevation. Below is a plain plastered wall, which is used as a sign board. A thick, flat awning tops three storefronts, which have different configurations. The building, which replaced a two-story J. C. Penney store ca. 1964, is too new to contribute to the historic character of the district.

411 D Street (APN 010 241 009)
Noncontributing Building, ca. 1925
This brick building has one story and a flat parapet on the front elevation which drops into a plain concrete wall. Bricks line the storefront, which has an entrance on the left. The facade treatment dates from after 1960. The building is too altered to contribute to the historic character of the district.

413 D Street (APN 010 241 010)
Noncontributing Building, ca. 1925
This building has two stories and a flat roof. Below the roof line of the front elevation is a raised band. Brick faces the elevation below. The second story has a central window and openings on each side; the first has a recessed entry and flanking display windows. The entire treatment, including the raising of the roof to add the second story, dates from after 1948. Because of the alterations the building does not contributes to the historic character of the district.

415 D Street (APN 010 241 011)
Noncontributing Building, ca. 1925
This brick building has one story and a flat parapet on the front elevation which drops into a plain wall. Below it is a flat, guyed awning atop a storefront with recessed entry and flanking display windows, all with brushed aluminum architraves. No historic fabric is visible, so the building does not contribute to the historic character of the district.

419 D Street (APN 010 241 016)
Contributing Building, ca. 1925
This building has one story and a flat, angled parapet capped with shingles. Below is a plain recessed panel originally used as a sign board. A fabric awning tops the storefront, which has a recessed entrance and wide flanking display windows. The door of brushed aluminum dates from ca. 1960, but otherwise no alterations are apparent. The building contributes to the historic character of the district.

420 D Street (APN 010 176 004)
Contributing Building, ca. 1937
This concrete building has two stories and a flat roof. On the front elevation, which has a stucco finish, are three sets of second-story windows topped by a continuous hood. Above the storefront is a metal signboard with bands at top and bottom and speed lines at each end. The storefront has two recessed entries with flanking display windows. Alterations are not apparent. The red sign, even without lettering, reveals that this building was the site of a Woolworth's store. The building contributes to the historic character of the district.

421 -23 D Street (APN 010 241 017)
Contributing Building, ca. 1925
This building has three stories. The front elevation is faced with brick on the upper stories and has a stucco finish below. A bracketed cornice caps the facade. Below on both the second and third story are two sets of multi-paned casement windows topped by

OMB No. 1024-0018

awnings. Between the windows on the second story is a Venetian window with raised hood. Below on the second story is a small medallion. A plain entablature caps the first story, which has an entrance on the left and storefronts on the right. The doorway has arched opening and wrought iron door. Two small arched windows are above. The storefronts have transom bands, one now filled in, and doors and display windows that have been installed since 1948. Despite changes to the storefronts, the building contributes to the historic character of the district.

422 -24 D Street (APN 010 176 003)
Noncontributing Building, 1912
This brick building has three stories. A flat parapet with long, narrow indented panels caps the front elevation. Below is a plain brick wall that shows through a slight change in bricks the former location of upper story windows. The storefront has a fabric awning, wide entrance, and flanking display windows. Originally an example of classical design, the building is now too altered to contribute to the historic character of the district.

427 D Street (APN 010 241 013)
Noncontributing Building, ca. 1952
This single-story building has a flat roof and plain cornice band. The front elevation is divided into three differently configured storefronts. The building was constructed too recently to contribute to the historic character of the district.

430 D Street (APN 010 176 001 & 002)
Noncontributing Building, 1940
This building has two stories and a stucco finish. Its current appearance, with plain rectangular panels on the front elevation and a series of blind arches on the other street elevation, reflects a ca. 1965 remodeling. The building originally had large grouped windows on the second story and wide display windows on the first. It is too altered to contribute to the historic character of the district.

OMB No. 1024-0018

5th and D Streets
Contributing Structure, ca. 1980
This metal electrolier arch spans the intersection of D and Fifth Streets. The arch has four poles, one on each corner, from which slender, curved trusses extend to the center of the intersection about 30 feet above the street. They meet in something like a newel post, which has a flag rising from the top and a light globe descending from the bottom. Small lights dot the undersides of the trusses. The district once had seven such arches. They were installed in 1911 and removed in 1926. One was reassembled in Rio Linda, a suburb of Sacramento. The arch there provided the model for this arch, which was put up as a part of the city's plan to revitalize the district. Since the reconstruction was accurate and no similar structures still exist, the arch contributes to the historic character of the district..

503 D Street (APN 010 182 007)
Noncontributing Building, ca. 1919
This building has one story and a stucco finish. A parapet, flat except for one step facing D Street, masks the roof. The plan is trapezoidal, with the entry facing the street corner. A guyed awing tops the entire storefront, which consisist mostly of display windows in brushed aluminum architraves. Above, a false cornice with brackets faces Fifth and D Streets, but is missing from the center, diagonal elevation. Indentations above the awning indicate the original vehicle openings, used when the building housed Newton Super Service in the 1920s. The present appearance appears to reflect a ca. 1960 remodeling. The building is too altered to contribute to the historic character of the district.

402 -10 E Street (APN 010 174 014)
Contributing Building, ca. 1929
This large single-story building has a flat roof and stucco finish. Small circular ornaments rise above the otherwise flat parapet on the street elevations. The entablature below has a notched cornice, plain frieze with circular decoration, and a narrow, finely indented architrave. Beneath each circle is a pilaster with an ornamented capital. The pilasters

divide the front elevation into five bays and the south (Fourth Street) elevation into nine. The front elevation has three storefronts topped by fabric awnings and a large garage door. The storefronts are not uniformly configured, though none clearly dates from after 1948. The detailing of the building is identical to that of its neighbor on the north. The building appears largely unaltered and contributes to the historic character of the district.

412 -14 E Street (APN 010 174 004)
Contributing Building, ca. 1929
This two-story building has a flat roof and stucco finish. Small circular ornaments rise above the otherwise flat parapet on the front elevation. The entablature below has a notched cornice, plain frieze with circular dècoration, and a narrow, finely indented architrave. A fabric awning below tops three three-part windows. A dentiled band tops the first story, where pilasters with ornamented capitals separate three bays. Each has a stucco panel, perhaps once the site of transom windows, a fabric awning, and a storefront. The storefronts are not uniformly configured. The one on the left with a glass paneled wood door may be original. The detailing is identical to that of its neighbor on the south. The building housed the Montgomery Ward store in the 1930s and 1940s. Despite changes to storefronts, the building remains essentially unaltered and contributes to the historic character of the district.

420 -22 E Street (APN 010 174 004)
Contributing Building, ca. 1929
This wide building has two stories and a stucco finish. The front elevation is symmetrical. Each half has a slightly protruding central section topped by a flat parapet that extends above the roof line. On the second story is an arched multipaned window with an embossed panel above the hood and a wrought iron balcony below. The first story has a vehicle entrance. The flanking sections have multipaned windows on the second story and segmentally arched vehicle entries on the first. A string course above the side course extends across the elevation. The parapets have lost espadanas with

finials, but otherwise the building remains essentially unaltered. It contributes to the historic character of the district.

513 E Street (APN 010 175 015)
Contributing Building, ca. 1940
The front part of this single-story building has an L-plan, flat roof, and stucco finish. A raised band extends across the south and west elevations below the roof line. Below it on the west elevation is a set of three garage doors. A window and door are to the left; two more windows are adjacent to the sidewalk on E Street. All have brushed aluminum architraves. In the rear behind the garage doors is an auto garage with a rounded roof. The treatment of the northern wing appears to date from about 1960. Despite the alterations, the building contributes to the historic character of the district.

515 E Street (APN 010 175 012)
Contributing Building, 1927
This concrete building, the State Theater, has three stories and a Spanish Colonial Revival design. Pilasters topped by finials divide the symmetrical front elevation into three bays. A high paneled frieze extends across the facade. Rising above the roof line in the center bay is a curvilinear parapet. Raised medallions decorate both frieze and parapet. Nine narrow, empty, semi-circular arched niches line the third story. The center window has a wide architrave. Below the window a sign, the two faces of which face the street diagonally, projects from the second story. "State" tops the sign. On both sides are three pairs of one-over-one windows and single windows at the ends, where the elevation expands slightly. A flat, guyed awning tops the first floor, which has a side recessed entry in the center and storefronts on each side. Some of the treatment of the first story is not original. In addition, a tall vertical sign and an ornamented marquee have been removed. Otherwise, the building remains unaltered. It contributes to the historic character of the district.

525 E Street (APN 010 175 013)
Contributing Building, ca. 1947
This building has one story. On the front elevation is a flat parapet atop a plain, stuccoed wall. A flat, guyed awning tops a storefront consisting mostly of display windows. A recessed entry is on the right. A ceramic tile kickplate extends across the elevation below the windows. No alterations are apparent. The building contributes to the historic character of the district.

527-29 E Street (APN 010 175 013)
Contributing Building, ca. 1947
This single-story building, originally a bus depot, has a flat roof and stucco finish. A wide band defines the roof line. Below it is a plain wall. Atop the storefront is a ribbed stringcourse that bulges in the center of the front elevation to form a small awning over the recessed entrance. Single-pane windows are on both sides. The windows may be replacements, but otherwise the building appears unaltered. It contributes to the historic character of the district.

530 E Street (APN 010 173 001)
Contributing Building, 1927
This brick building has two stories and a flat, inwardly slanting parapet capped with tiles. The entablature below features a frieze with small semi-circular arches. Closely spaced second-story windows have small panes with transoms above. Below them is a banded string course. Tall window openings on the first story have small paned transoms and slightly recessed surrounds. The main entrance, centered on the symmetrical front elevation, displays the building's only important alterations: removal of the transom and a guyed awning and replacement of the original door. The building originally served as the regional headquarters for the Pacific Gas and Electric Company. It contributes to the historic character of the district.

Southern Section

223 First Street (APN 010 284 013)
Contributing Building, ca. 1888
This brick building has one story and a flat parapet. On the front elevation a stuccoed wall rises above the storefront, which has a slightly recessed entrance and flanking display windows with a ceramic tile wall below. Narrow courses of exposed bricks define the cornice and top the storefront, while a wider line of bricks lines each side of the storefront. On the extreme right of the front elevation is a single-story engaged Corinthian column, which gives a clue to the appearance of the building before the present (ca. 1948) renovation. The building began as a commercial structure in Chinatown, then served as a billiard parlor for Japanese-Americans after the turn of the century. The plain front door appears to be a recent replacement. Otherwise, no alterations are apparent. The building contributes to the historic character of the district.

226 First Street (APN 010 300 017)
Contributing Building, ca. 1888
This brick building has one story. A high, flat parapet with a tiled cornice tops the symmetrical front elevation. Centered in the parapet wall is a small vent. The storefront below has a glass paneled door flanked by display windows with four panes. The building, long a commercial structure in Chinatown, may have been extended to the rear at the turn of the century. The cornice tiles are probably not original. No other alterations are apparent. The building contributes to the historic character of the district.

228 First Street (APN 010 300 015)
Contributing Building, 1858
This brick building has two stories. An ornamented parapet with dentiled cornice and frieze of patterned brick tops the front elevation. Centered above the parapet is a step with brick lettering announcing "Kim Wing Building 1913." Pilasters side the step and continue down to divide the second story into three bays. Each has a segmentally arched

OMB No. 1024-0018

opening with elevated hood. The center opening contains a door, the others have one-over-one windows. A metal balcony extends across the elevation beneath the openings. A transom band tops the storefront below, which has two double doors with stacked glass panes. A door on the right appears to be a replacement, but otherwise the building has remained unaltered since 1913. Before that it had only one story and a completely different facade. The building contributes to the historic character of the district.

230 First Street (APN 010 300 014)
Contributing Building, 1860
This brick building has two stories. Atop the front elevation is a dentiled cornice. Segmental arches cap three second-story openings--a central door and flanking windows. Beneath the door and the window on the right is a metal balcony. A transom band tops the storefront, which has a display window on the left and two sets of double doors. No alterations are apparent. The building is probably much older than it appears, having had one story and a different facade. It contributes to the historic character of the district.

232 First Street (APN 010 300 013)
Contributing Building, 1858
This two-story brick building has a flat parapet and stucco finish. On the second story are two one-over-one windows with a metal balcony below. Exposed brick lines the storefront openings, which have double transoms. A double door on the right is the main entrance. The treatment probably dates to ca. 1925, when the second story was added. No later alterations are apparent. The building contributes to the historic character of the district.

301 First Street (APN 010 282 008)
Contributing Building, ca. 1862
This two-story brick building incorporates elements of traditional Chinese design. The second story has a stucco finish, while light colored bricks face the first story. A small curved parapet with "1937" caps the front elevation. Below is a second-story balcony

topped by a hipped tile roof with highly flared eaves and a scalloped frieze. A metal railing fronts the balcony, which has delicate metal ornament below the frieze between the two central supporting poles. A row of doors look out on the balcony. Chinese characters are prominently displayed on the wall around a central double door. On the first story are an arched entrance with recessed door on the left and two storefronts with transom bands. The wide central storefront has a double door and flanking display windows. The narrower storefront on the right has similar features. The balcony extends along the other street elevation, which also has another entry and storefront. No alterations are apparent. The present appearance represents an extensive remodeling of an much earlier structure which occurred after a serious fire. The building, the home of Suey Sing, a longtime Chinese-American business and fraternal organization, contributes to the historic character of the district.

310 First Street (APN 010 300 055)
Contributing Building, ca. 1860
This brick building has two stories and a flat parapet. On the front elevation the frieze has slightly recessed panels. Protruding from the second story below is an oriel window with narrow glass panels. Centered on the first story is a window in a semi-circular arched opening. On each side is a door with boarded transom. The oriel window and probably arched window are recent additions. The building was one of many in Chinatown with mixed retail and residential uses. Despite changes, the building retains enough of its historic feeling to contribute to the character of the district.

312 First Street (APN 010 300.055)
Contributing Building, 1860e
This brick building has two stories and a flat parapet. On the front elevation the frieze has slightly recessed panels. Second-story windows are six-over-six metal sash in openings with bricked-in tops. On each side is a door with boarded transom. The second-story sash and probably the arched window are recent additions. The building was one of many

in Chinatown with mixed retail and residential uses. Despite changes, the building retains enough of its historic feeling to contribute to the character of the district.

315 First Street (APN 010 282 027)
Noncontributing Building, ca. 1900
This is a two-story wood-frame house that received a substantial renovation or perhaps reconstruction ca. 1985. The building has two stories, horizontal board siding, and a hipped roof. An enclosed cupola rises from the roof ridge. A large gabled dormer with shingle siding projects from the roof in the center of the front elevation. Windows are small-paned metal sash. The second story overhangs the first and is supported by plain posts. The design of the building may date from the turn of the century, but the materials all appear to be new. The building does not contribute to the historic character of the district.

320 First Street (APN 010 300 005)
Contributing Building, ca. 1860
This brick building has two stories and a flat parapet. A dentiled cornice caps the front elevation. Below are five six-over-six metal sash windows topped by fabric awnings. A signboard tops the storefront, which has five narrow, slightly recessed openings--a central door and adjacent windows--with transoms above. The windows have small-paned metal sash. All the sash and probably the first story brick date from the past twenty-five years. The building originally housed one of Chinatown's retail and residential establishments. Later its second floor served as the city's most famous bordello. It had an earlier expansion and storefront remodeling ca. 1900. Despite changes, the building retains enough of its historic feeling to contribute to the character of the district.

322 First Street (APN 010 300 004)
Contributing Building, 1858
This brick building has two stories and a flat parapet. A dentiled cornice caps the front elevation. Below are two six-over-six metal sash windows topped by fabric awnings. A

signboard tops a wood-framed storefront, which has a transom band atop a central display windows and flanking entries. The sash is recent, and the storefront may date from ca. 1940. Like many in Chinatown, the building originally had mixed retail and residential uses. Later it was part of the brothel next door. Aside from the window sash, alterations from the past fifty years are not apparent. The building contributes to the historic character of the district.

324 First Street (APN 010 300 054)
Noncontributing Building, 1858
This brick building has two stories. On the second story of the front elevation is a series of long, narrow semi-circular arched openings with short multi-paned casement windows. Below is an arcade with similar arches and tall pillars. The wall, recessed about two feet, contains a set of one-over-one windows. The existing facade owes something to the building's 1880 appearance. The pillars are original. The brickwork, though similar to the original, is new and covers original brick. The wood wall and first-story windows also appear to be recent, while the upper story windows may date to the 1940s. The building, though very old, has lost a clear connection to its appearance at any point in the past. The building is too altered to contribute to the historic character of the district.

330 First Street (APN 010 300 052)
Contributing Building, ca. 1854
This two-story brick building has a hipped roof and rough stucco finish. Six one-over-one windows, a bit shorter than the reveals, are closely spaced along the second story of the front elevation. The other street elevation has a similar set of more widely spaced windows. A banded belt course tops both sets. The storefront has a central entrance flanked by two windows. Another group of windows proceeds back along the west elevation to a small, single-story side addition. The entire treatment of the first story appears to be fairly recent, but the upper story has probably not been altered in at least fifty years. The building has had a number of commercial uses over the years, apparently

none of which was related Chinatown. Despite changes, the building contributes to the historic character of the district.

25 C Street (APN 010 300 035)
Two Contributing Buildings, ca. 1860
This brick building has one story, a stucco finish, and a flat parapet. The front elevation has three openings: a filled-in doorway with a semi-circular arched transom, a small window with a similar transom, and a door with an awning. The original function of this small building is unknown, though it was in residential use by 1909. It has probably looked much like this for at least fifty years. To its right is an old garage with corrugated metal siding and double doors. Both buildings contribute to the historic character of the district.

East of 25 C Street (APN 010 300 034)
Contributing Building, ca. 1925
This brick building has one story and a side-facing gable roof of corrugated metal. On the front (south) elevation is a narrow central door and a boarded window on the right. For many years the building served as a hospital or rest home for members of the Chinese community. It replaced an earlier building on the parcel which had the same function. The building appears unaltered. It contributes to the historic character of the district.

101 C Street (APN 010 284 014)
Contributing Building, 1856
This brick building has two stories, a flat parapet, and a stucco finish. A dentiled cornice tops the street elevations. On the second story one-over-one windows have plastic coated sash and are set in deep reveals. The store entry below has a paneled metal door and aluminum-sided windows in wood architraves. A metal gate fronts the entry. To the left is a recessed doorway with transom and plain door. The building contained a Chinese restaurant and gambling house for many years. Despite the use of some new materials,

the building retains most of its historic appearance and contributes to the historic character of the district.

103 C Street (APN 010 284 015)

Contributing Building, 1858

This brick building has two stories and a flat parapet. Atop the front elevation are a dentiled cornice and plain frieze. On the second story are three one-over-one windows with plastic coated sash. Below are a newly installed storefront with anodized aluminum windows and door and a recessed doorway, also with new materials. The building served Chinatown with a number of uses, including a grocery and a restaurant. Despite recent changes, the building contributes to the historic character of the district.

107 C Street (APN 010 284 017)

Contributing Building, ca. 1915

This brick building has two stories and a flat parapet. A wide, banded frieze tops the front elevation. Centered on the second story is a pair of one-over-one windows with a wood railing below. On each side is a wider one-over-one window. The main entrance on the first story is centered; it contains a double door with glass panels below two stacked transoms. A smaller door on the left has a similar set of transoms. On the right is a display window with a single transom. All openings have wood architraves. The building displays no conspicuous alterations and contributes to the historic character of the district.

112 C Street (APN 010 282 007)

Contributing Building, 1858

This brick building has two stories and a flat parapet. A dentiled cornice caps the front elevation. On the second story below three one-over-one windows in deep reveals are evenly spaced across the elevation. A soldier course tops the storefront, which has two windows and a door on the right. All have anodized aluminum frames. Originally in

OMB No. 1024-0018

commercial use, the building was a mission school for many years. Despite some new materials, it contributes to the historic character of the district.

118 C Street (APN 010 282 024)
Contributing Building, ca. 1925
This brick building has two stories. A stepped parapet tops the front elevation, which is sided in grooved brick. On the second story are two pairs of one-over-one windows. The storefront, which extends across most of the first story, has a transom band, a paneled door, and flanking display windows with a low wall beneath. To the right is another doorway with a transom. One display window is boarded, and the door on the right appears to be a replacement. Otherwise, no alterations are apparent. The building contributes to the historic character of the district.

7 D Street (APN 010 300 053)
Contributing Building, ca. 1887
This brick building has two stories and a front-facing gable roof with overhanging eaves. On the front elevation the eave has an ornamental kingpost at the apex and curved brackets on each side. On the second story three segmentally arched one-over-one windows overlook a wood balcony with a low, elaborately designed wall. The porch below has plain posts. A leaded glass transom tops the front door, on the right. To the left are two windows like the ones above. A wrought iron fence fronts the property. The building has always been a dwelling. Its original function, as "female boarding," suggests commercial activity beyond use merely as rental units. The windows have metal sash, and the front porch does not appear to be original. Despite changes, the building contributes to the historic character of the district.

103 D Street (APN 010 282 013)
Contributing Building, ca. 1946
This L-shaped building has several sections. A one-story entrance takes up most of the front elevation. A flat parapet wall is used as background for a neon sign announcing

"Tower" in a modern sans serif typeface. Atop a banded marquee is a double-faced signboard. The wide recessed entryway has a set of doors with fluted panels and poster display cases with fluted surrounds. To the right is a semi-circular ticket booth sided with ceramic tiles. Above the booth rises a tall tower with vertical bands on the shaft and a neon sign on top. The sign proclaims "Tower" in a weighted sans serif typeface. To the right of the tower facing south is a narrow single-story commercial space with a flat parapet and arched windows. An unornamented two-story section, housing the auditorium, forms the intersecting leg of the L in the rear. Some of this wing may contain remnants of an earlier theater on the site. The storefront on the right has some new materials, but no other alterations are apparent. The building contributes to the historic character of the district.

113 D Street (APN 010 282 014)
Contributing Building, ca. 1870
This brick building has one story and a flat parapet with a slightly raised cornice. A fabric awning tops the ca. 1940 storefront, which has a recessed entry and flanking display windows. The building housed a bag manufacturer for many years. It contributes to the historic character of the district.

115 D Street (APN 010 282 014)
Contributing Building, ca. 1870
This brick building has two stories, a flat parapet, and a stucco finish. A multibanded cornice with a dential course caps the front elevation. Below are three two-over-two windows with raised lintels and sills. The storefront, recently installed and topped by a fabric awning, has a double door on the left and window on the right. The building, which had a variety of commercial uses over the years, contributes to the historic character of the district.

113 -17 Oak Street (APN 010 282 023)
Noncontributing Building, ca. 1960
This cinder block building has one story and a flat roof. The front elevation, faced in brick, has two garage doors in the center, each flanked by a smaller door. The building was constructed too recently to contribute to the historic character of the district.

SIGNIFICANCE

The Marysville Historic Commercial District represents the development of commerce in the city from the mid-nineteenth century to just after the end of the Second World War. The district provides the city's only sizable collection of commercial buildings constructed before 1948. It has strong links to early retail business as well as later commercial development. Although the district has changed its appearance since 1948, it retains a high degree of architectural integrity and maintains its associations to the historic period.

Commercial activity in the downtown area coincided with the beginning of the Gold Rush. As strikes were made in the northern foothills, miners sailed up the Feather and Yuba Rivers to reach the gold fields. Charles Covillaud owned a trading post and livestock ranch north of the confluence of the rivers. In 1849 he consolidated holdings, laid out a new town, and began selling lots. Other merchants moved quickly to exploit Marysville's advantageous location. By 1850 the town had become the main supply point for thousands of miners upriver in the foothills. Several dozen businesses operated from canvas tents and other impermanent structures along the Yuba River. The permanent population reached about 500.

Marysville and its commercial district grew rapidly in the 1850s. The town became the Yuba County seat in 1850 and incorporated in 1851. The population grew steadily, reaching around 4,000 by the end of the decade. Businesses grew in number and diversity. Many, from banks and blacksmiths to clothiers and saloons, appealed to miners. Capital investment increased too. Spurred by one flood and several major fires, businessmen replaced tents and other flimsy structures with larger buildings made of brick. Local kilns were kept busy, as nearly 140 brick commercial buildings went up between 1851 and 1855. The business district expanded north from the waterfront. Many local miners were immigrants from China, who sought goods and services from fellow countrymen. Part of the commercial district became their center for supplies and

OMB No. 1024-0018

temporary housing. The permanent Chinese population in town rose to around 1,000 by the end of the decade. Marysville became *Sam Fou*, the third most important city for Chinese in California. Mixed use typified buildings throughout the district. Retail stores occupied the first story and residences the second.

The district did not grow much in the next four decades. The commercial zone stayed south of Fourth Street, even when floods and fires required buildings to be replaced. The last and most serious flood, in 1875, prompted the construction of a levee that closed off most of the district from the Yuba River. The Central Pacific Railroad arrived in the 1860s, establishing a link that slowly diverted traffic from the river. The district's clientele changed. Gold became less accessible to miners, forcing many of them to leave the area. Agriculture, on the other hand, enjoyed steady growth. More land opened to cultivation, prices rose, and the number of local farmers increased. Wheat became the most popular and profitable crop. The town grew in size and changed somewhat in character, with women and children replacing single men. Marysville's population reached 4,700 in 1870, making it the eighth largest city in the state. The number of residents then slowly declined through the end of the century. The commercial district diversified, offering a wide range of goods and services in more than 200 separate businesses. Chinese establishments, mostly in the southeast quadrant of the district, maintained their own clientele but shared in the prosperity. Three benevolent associations (tongs) helped to place workers and settle business disputes. When in the 1880s anti-Chinese sentiments led to violence elsewhere, Marysville became a refuge for displaced Chinese workers. In the 1890s the local economic situation worsened, as the international wheat market collapsed, the nation went into a depression, and many Chinese left the country in response to discriminatory state and federal laws.

More than other factors, changes in agriculture after the turn of the century generated new wealth in Marysville and surrounding areas. The district expanded dramatically. Irrigation was the key. Canals from local rivers made possible the cultivation of irrigated crops on small farms. Wheat ranchers subdivided their holdings into 20- to 40-acre parcels, which new settlers planted in a variety of crops, especially fruit orchards. Peaches led the way. By the 1920s Yuba and neighboring Sutter County were producing half the world's supply of clingstone peaches. Other important crops were rice, raisins, prunes, and beans. Farm income shot up. Marysville, main trading center for the revivified agricultural region, became the Hub City. Two new railroads, the Western Pacific and the Northern Electric, which had arrived around 1910, provided alternative shipping channels. The town became regional headquarters for major corporations, notably Pacific Gas and Electric Company and Standard Oil Corporation. Local industry expanded. One firm with an international market was the Yuba Construction Company, which began manufacture of gold dredges and tractors in 1905. The district's stores stocked everything for the local consumer, from cars and farm implements to clothes and groceries. The town's population, reversing its previous slide, jumped 65 percent between 1900 and 1930.

In the eyes of Marysville's business and civic leaders, business expansion faced only one serious obstacle. Most commercial buildings suffered from obsolescence. Dating from the 1850s, many were small and dilapidated. They hardly fit with the modern, up-to-date city that Marysville was becoming. Building owners, often living elsewhere, showed no interest in making changes. The result was a major construction boom, primarily on the blocks between Fourth and Sixth Streets. Some twenty buildings, valued at well over a million dollars, went up during the 1920s. Many others underwent substantial renovations. Two buildings in particular represent this era of expansion and optimism. The Hart Building, designed for offices, rose seven stories and became what was probably the tallest commercial structure between Sacramento and Portland. The five-story Hotel Marysville, financed by a group of local businessmen, offered travelers accommodations as elegant as those found in any small city in California.

The Great Depression of the 1930s brought an end to prosperous times. As in much of California, downtown businesses in Marysville limped along, providing service to their regular customers but not expanding their operations. Agricultural income plummeted,

OMB No. 1024-0018

but gold dredging continued to keep Yuba County among the state's top gold producers and cushioned the worst effects of the depression. The town's population increased by about 15 percent during the 1930s, but it was not enough to generate new construction until the end of the decade. The Second World War, especially the opening of the huge Camp Beale just south of the river, revived the economy. Downtown continued a resurgence in the years directly after the war, as pent-up consumer demand kept business humming. A few new buildings went up, and several more were modernized.

Commercial activity in the district maintained its postwar level into the 1960s. But it did not attract new customers, many of whom lived miles from downtown and relied on automobiles for all their travel. Business shifted to stores with adjacent parking lots, especially those in strip malls just over the Feather River bridge in Yuba City. Just as old buildings seemed obsolete to civic leaders in the 1920s, downtown itself began to appear outdated by the 1970s. The area south of Third Street, which had seen little substantial investment in over a century, became the target of a redevelopment project. In 1977 three blocks were cleared for a department store, smaller shops, and library, all surrounded by parking. The project did little for business activity to the north, where commerce did not return to its 1948 level. Chinatown was spared redevelopment. Instead, it continued a slow deterioration, as the local Chinese American population dwindled and the old buildings failed to draw new tenants.

The district's period of significance includes the time during which the most important events occurred in Marysville's commercial development. Resources remain to illustrate most of these developments. The opening date of 1854, an approximation, represents the construction of the district's earliest remaining buildings. The closing date, 1948, indicates that the important historical events in the development of local commerce had happened by that time. The district reflects the period through a collection of contributing buildings that retain their architectural integrity and were constructed between 1854 and 1948.

The district retains historic and architectural cohesiveness in several ways. First, it contains a high proportion of contributing elements, with nearly more than 70 percent of the total falling in this category. Second, as a group, contributors are larger and more conspicuous than non-contributors. All seven of the district's buildings over two stories contribute, for example. Further, the contributors, although constructed during a 94-year period, usually share two important characteristics. They extend to the parcel lines in the front and on the sides, and they have storefronts with recessed entrances and flanking display windows. In addition, because many non-contributors share these attributes, the district retains an overall coherence that is greater than might be expected through an analysis of its components. Although district boundaries are much smaller than they were in 1948, the streets have maintained their original uses, grid pattern, and original widths. All alleys remain open and functioning. Some "alleyscapes" retain more of their historic appearances than the block faces in front. Both sections of the district retain architectural integrity. The characteristics that enhance the cohesiveness of the district as a whole also heighten the cohesiveness of its two sections.

Some aspects of the district intrude upon its historic character. The zone of new construction between the two sections weakens the depiction of continuity between commerce in the nineteenth and twentieth centuries. A number of buildings, although they still fit downtown, have lost so much of their original detailing that they no longer convey their historic associations. In addition, several contributors have undergone storefront modifications out of keeping with their original designs. These intrusions, however, do not undermine the district's architectural integrity.

The historical importance of the district is clear when compared with other commercial areas of Marysville. Commercial buildings west of E Street, near B Street, and along East Twelfth Street are less old, numerous, and diversified than those in the district. Outlying strip malls have even less historic character.

OMB No. 1024-0018

The Marysville Historic Commercial District is significant historically for the role it played in the commercial development of the city. It maintains its association with the city's commercial development from the 1850s to the 1940s. No other area of the city was nearly as important in commerce during the period. Although broader significance is not being claimed, the district may also have importance for its ability to illustrate the contribution of Chinese merchants to the economic development of urban California during the nineteenth century.

OMB No. 1024-0018

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VERBAL BOUNDARY DESCRIPTION

The boundary is shown as the broken line on the boundary map below.

BOUNDARY JUSTIFICATION

The boundary includes the historic resources and their immediate setting. It excludes new construction and empty lots just beyond the peripheries of the district and in the area separating the district's two sections.

PHOTOGRAPHS

Views of the photographs are shown on the attached photo key map.
Photographer: Donald S. Napoli
Date of Photographs: June and July 1998
Location of original negatives, City Hall, 526 C Street, Marysville, CA 95901

Photo No. 1
530 E Street, from northeast

Photo No. 2
515 E Street, from northwest

Photo No. 3
418-30 Fifth Street, from northeast

Photo No. 4
D Street, west side, from north

Photo No. 5
D Street, east side, from north

Photo No. 6
401-07 Fifth Street, from south

Photo No. 7
408-14 D Street, from east

Photo No. 8
421-25 Fourth Street, from southwest

Photo No. 9
410-14 Fourth Street, from northwest

Photo No. 10
Fourth Street, 400-block, north side, from east

Photo No. 11
332 D Street, from northeast

Photo No. 12
327-31 D Street, from northwest

Photo No. 13
322-24 D Street, from east

Photo No. 14
D Street, west side, from south

Photo No. 15
D Street, east side, from south

Photo No. 16
411-13 and 415 Third Street, from southeast

Photo No. 17
306 and 308 C Street, from northeast

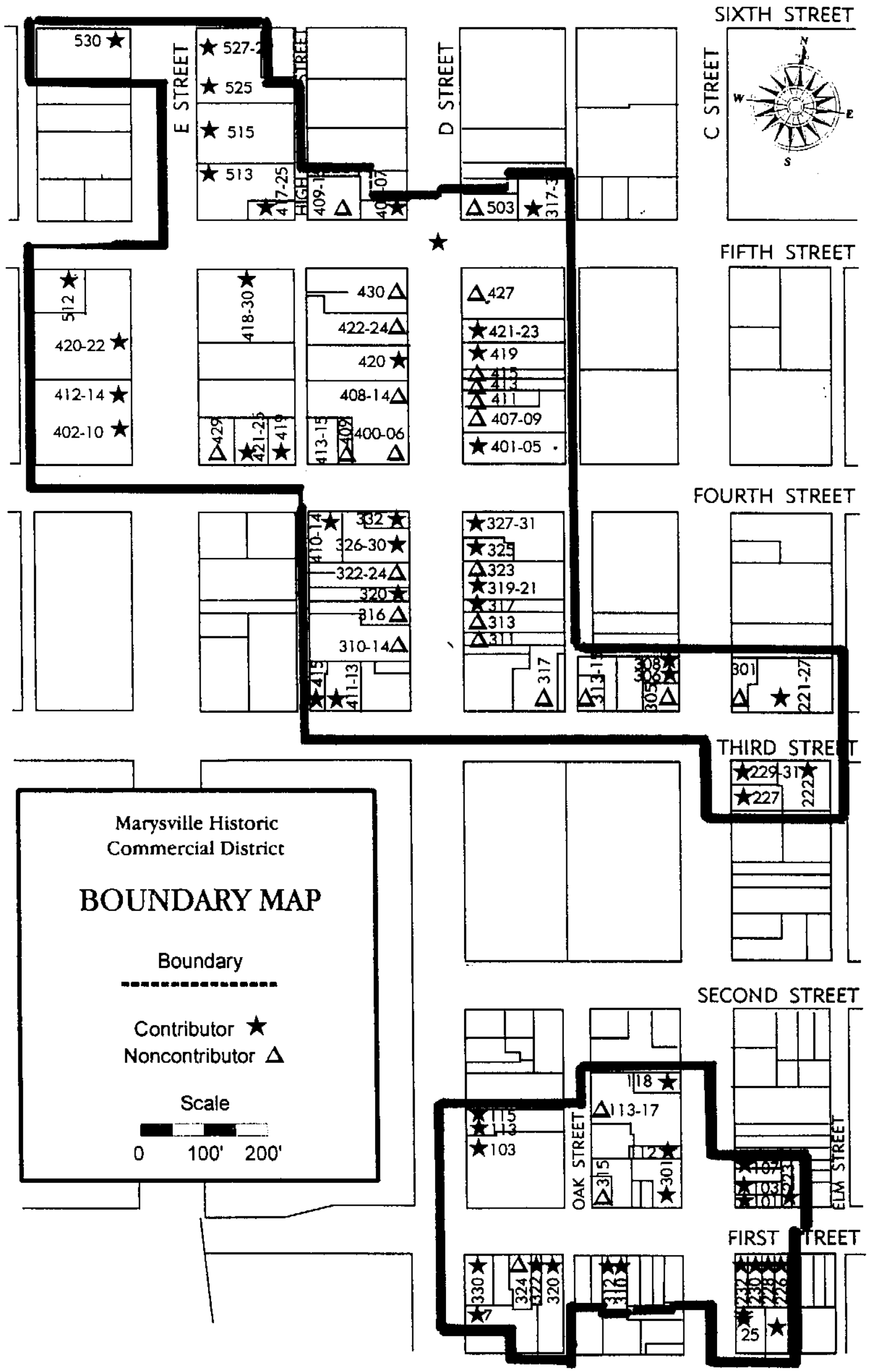
Photo No. 18
229-31 Third Street, from northwest

Photo No. 19
103 D Street, from northwest

Photo No. 20
First Street, 300-block, south side, from west

Photo No. 21
301 First Street, from south

Photo No. 22
First Street, 200-block, south side, from northeast


Marysville Historic
Commercial District
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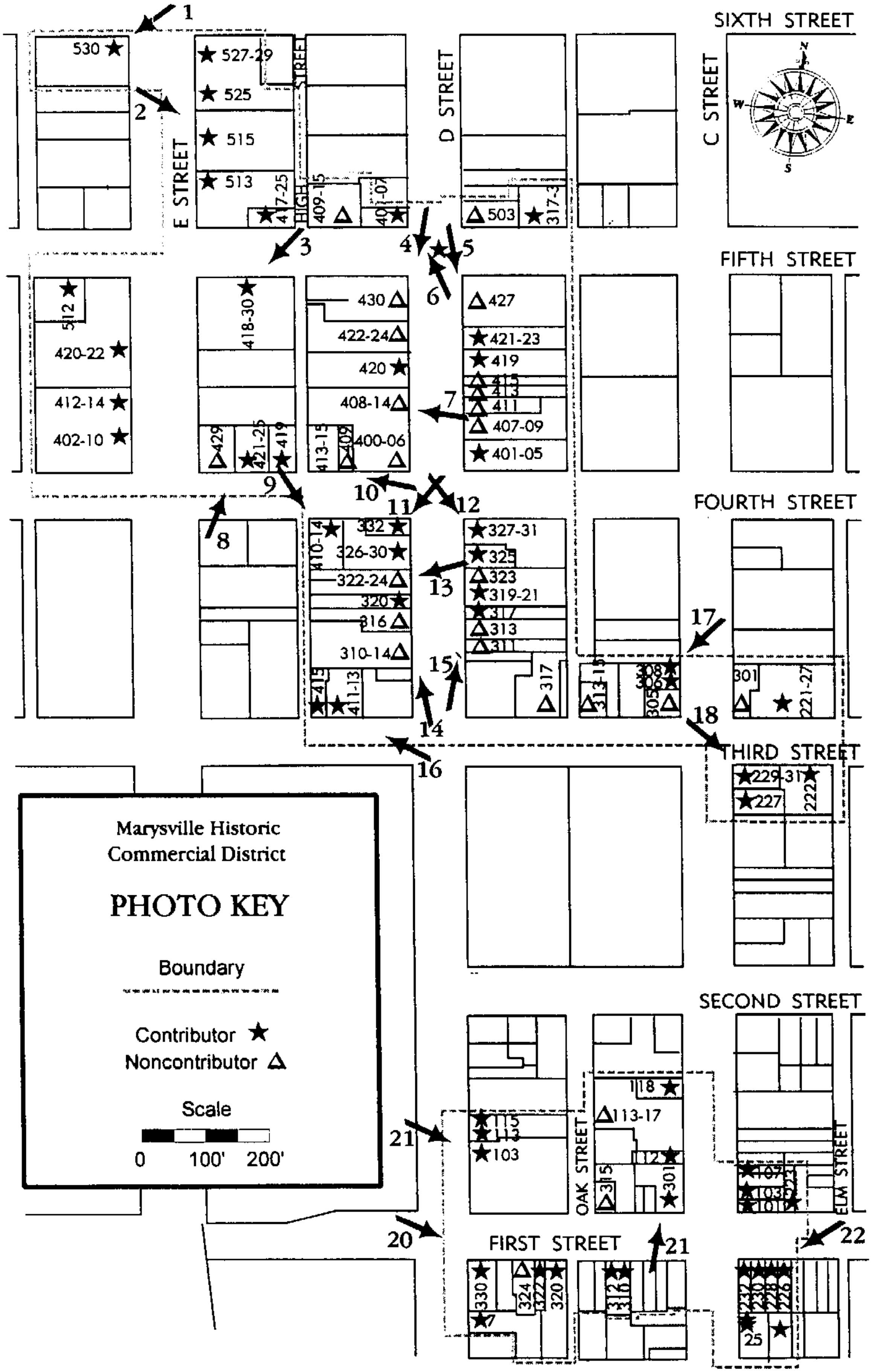
Marysville Historic
Commercial District
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Photo No. 4
D Street, west side, from north

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D Street, east side, from north

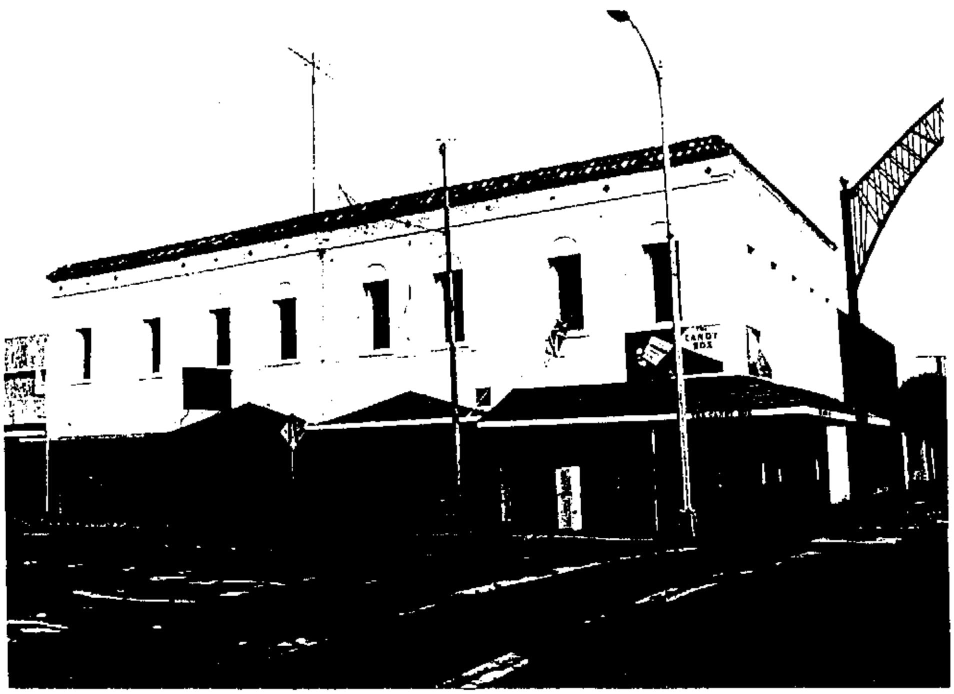
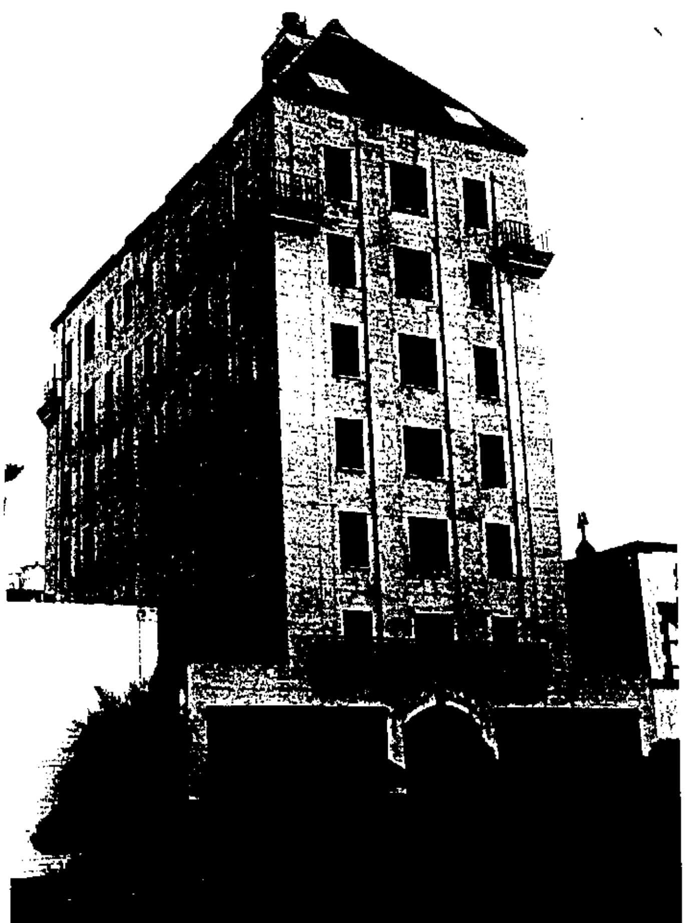


Photo No. 6
401-07 Fifth Street, from south

Photo No. 7
408-14 D Street, from east



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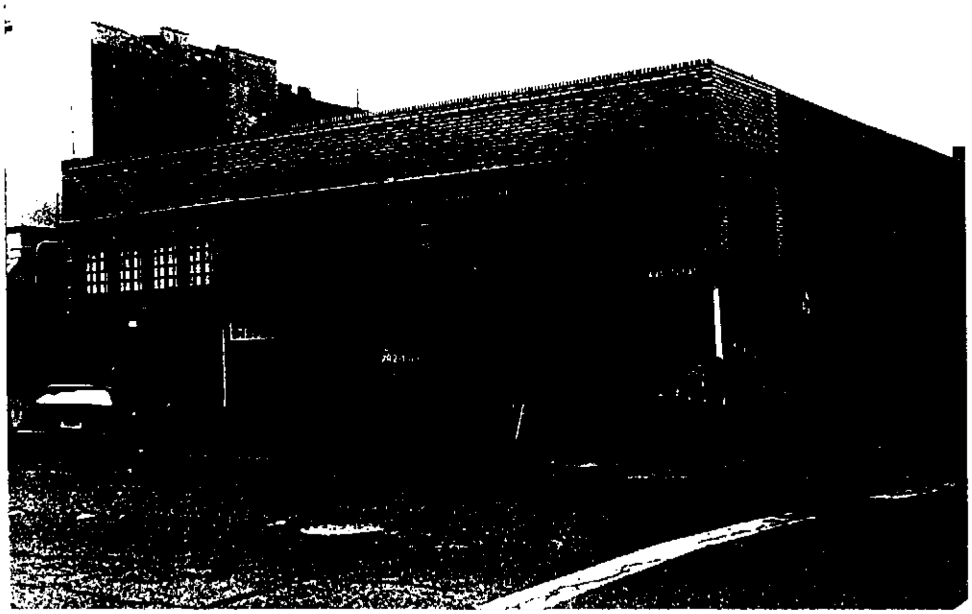

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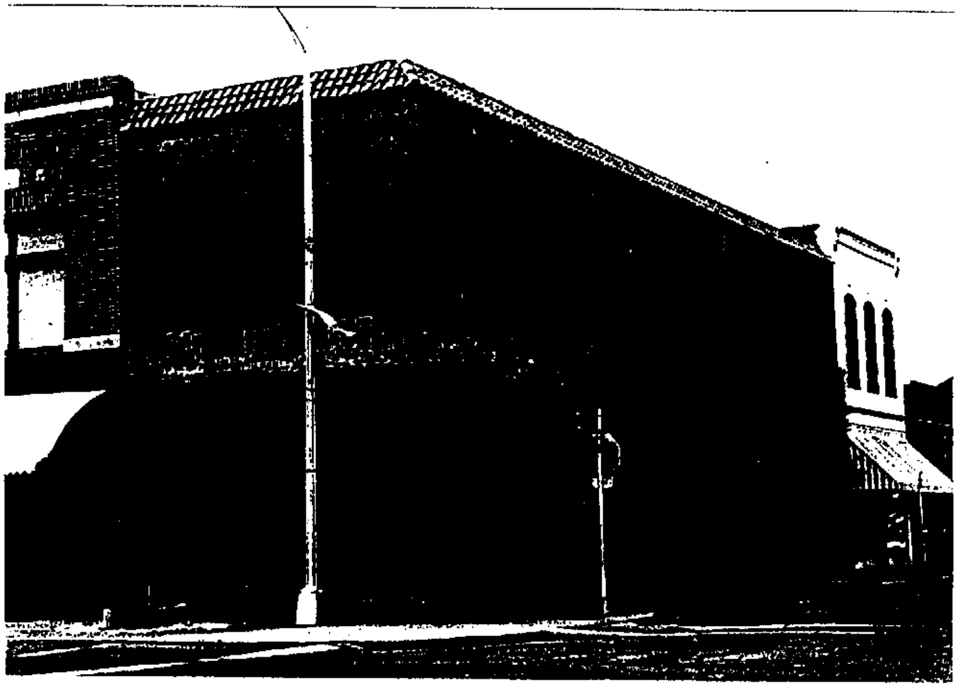
410-14 Fourth Street, from northwest

Photo No. 10
Fourth Street, 400-block, north side, from east



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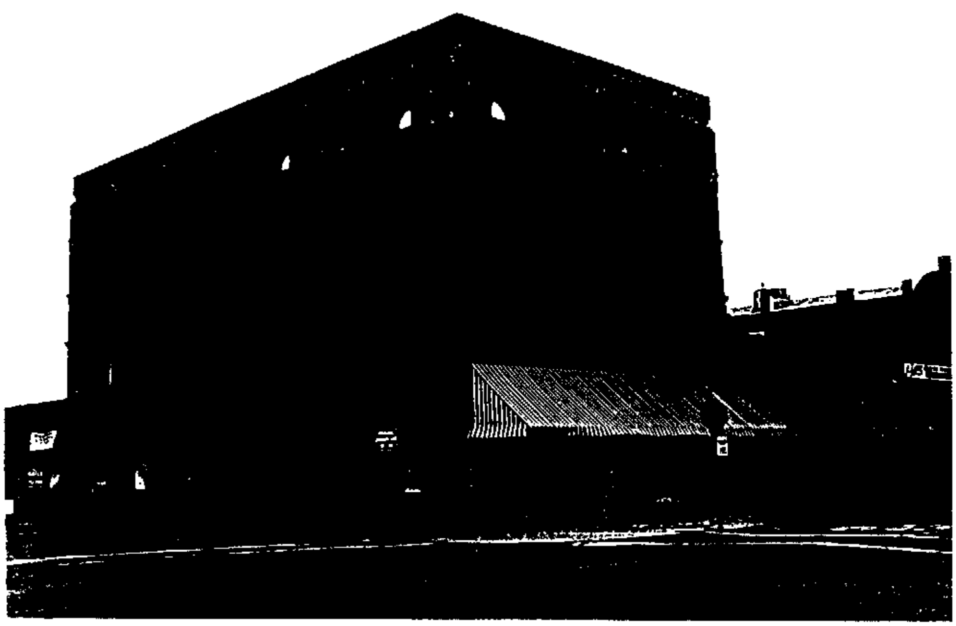
332 D Street, from northeast



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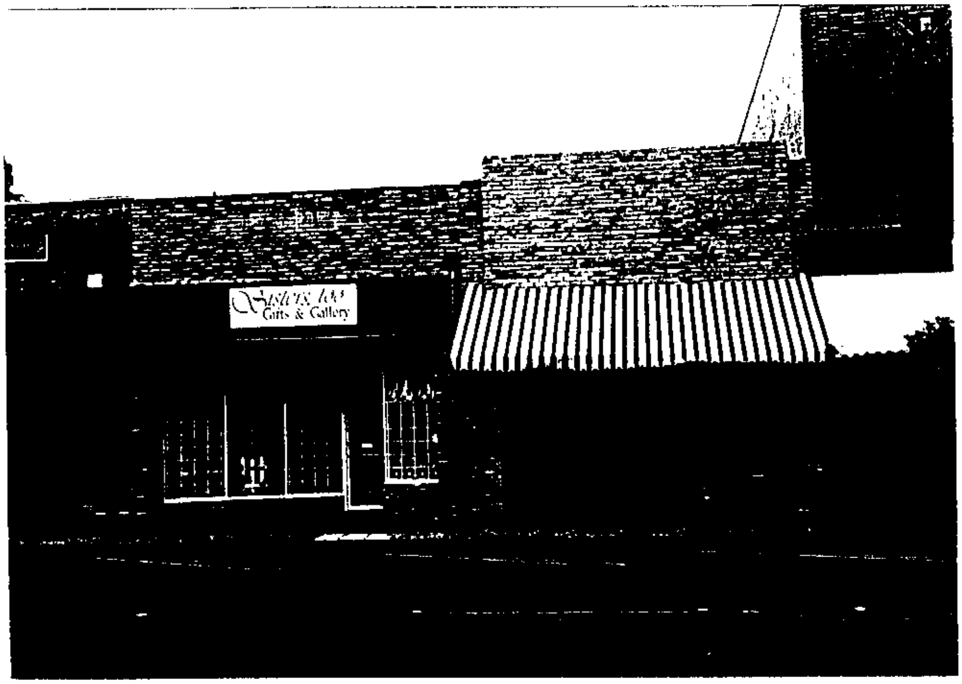
327-31 D Street, from northwest



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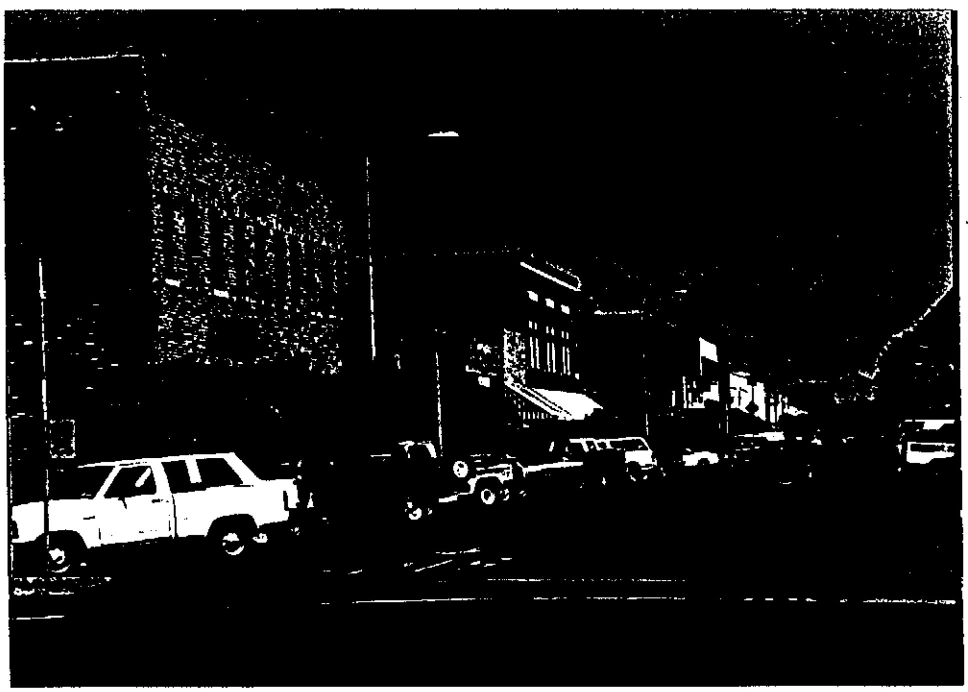
322-24 D Street, from east



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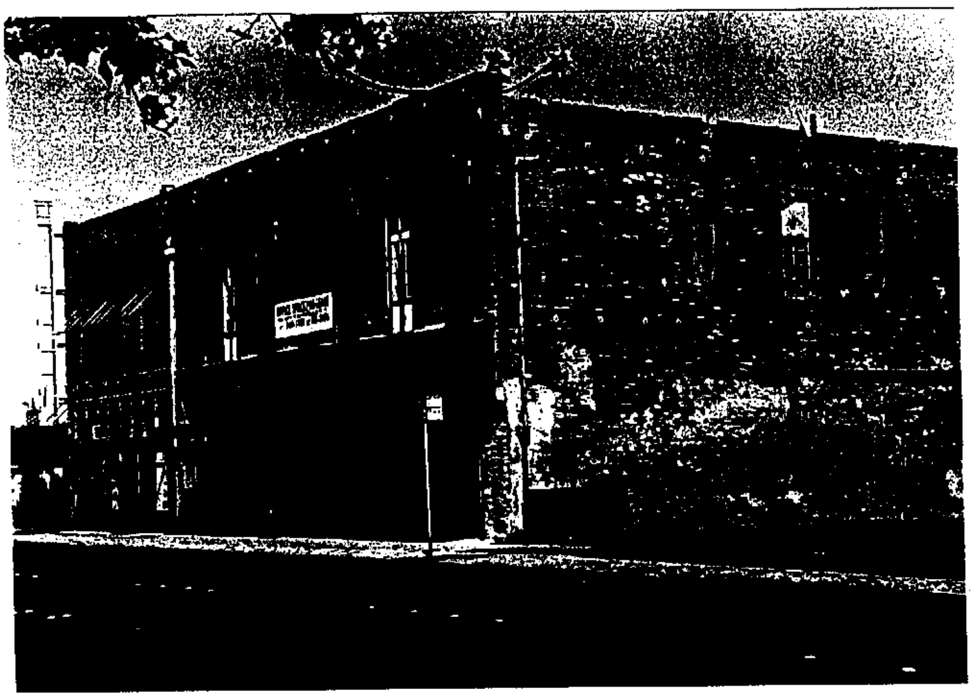
D Street, west side, from south

Photo No. 15
D Street, east side, from south



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411-13 and 415 Third Street, from southeast

Photo No. 17
306 and 308 C Street, from northeast

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Photo No. 19
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Photo No. 20
First Street, 300-block, south side, from west

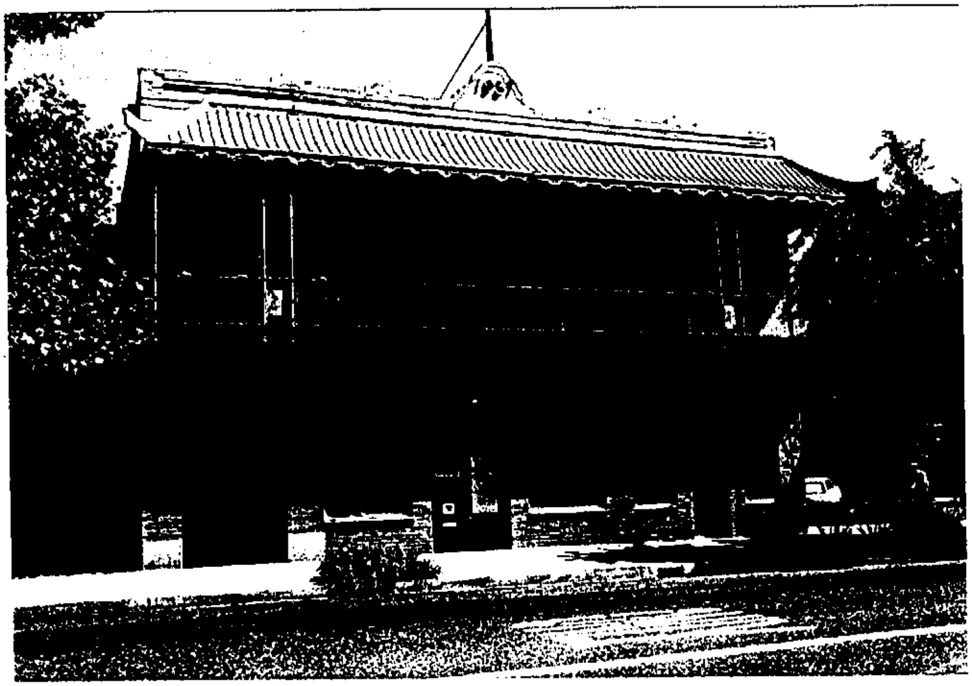

Photo No. 21
301 First Street, from south

Photo No. 22
First Street, 200-block, south side, from northeast

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SCALE