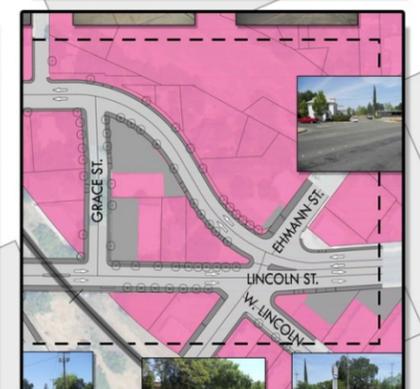


Lincoln & Huntoon Streets Restoration Plan



Oroville, California



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Purpose

The purpose of this plan is to analyze the existing physical conditions of the Lincoln/Huntoon couplet and prepare conceptual plans that restore this one-way couplet back to its original bi-directional flow with planters and street furniture.

To provide for the bi-directional flow, a roundabout is proposed where Lincoln and Huntoon Streets converge at the south end of the historic downtown. This will also create a focal point and gateway into the south entrance to downtown.

It should be noted however, that the purpose of the plan is not to debate the tradeoffs of converting the streets from one-way to two-way, but rather to provide concepts for improvements should the conversion take place.

These improvements are designed to assist the City in addressing several key economic development indicators which include economic diversification, private sector investment and increased job opportunities.

The City has long experienced vacancy issues due to heavy business turnover in its downtown area. Prospective business owners, particularly retail businesses and restaurants, are attracted to the historic old town due to its quaintness and proximity to the Feather River; however, the lack of an inviting and expedient corridor to this area has been a deterrent for attracting the shoppers, tourists and diners who normally would patronize this type of locality.

This plan will provide direction for streetscape and traffic improvements in an effort to enhance pedestrian safety, bring continuity to the downtown area and create a more vibrant experience that will attract new business and shoppers alike.

Study Area

The Lincoln and Huntoon Streets Restoration Plan addresses a five block area located in the heart of Historic Downtown Oroville. See Figure 1. This section of Lincoln and Huntoon Streets serves as a “One-Way Couplet” which by definition is a pair of one-way streets that function as a single higher capacity street.

As depicted in Figure 1 the couplet is separated by one city block, allowing travel in opposite directions. These parallel roads are approximately 1,800 feet in length and provide a key north/south connection to the downtown area. Therefore, this document is intended to be the first step toward such and subsequent planning. Future design efforts should build upon the information prepared in this plan.

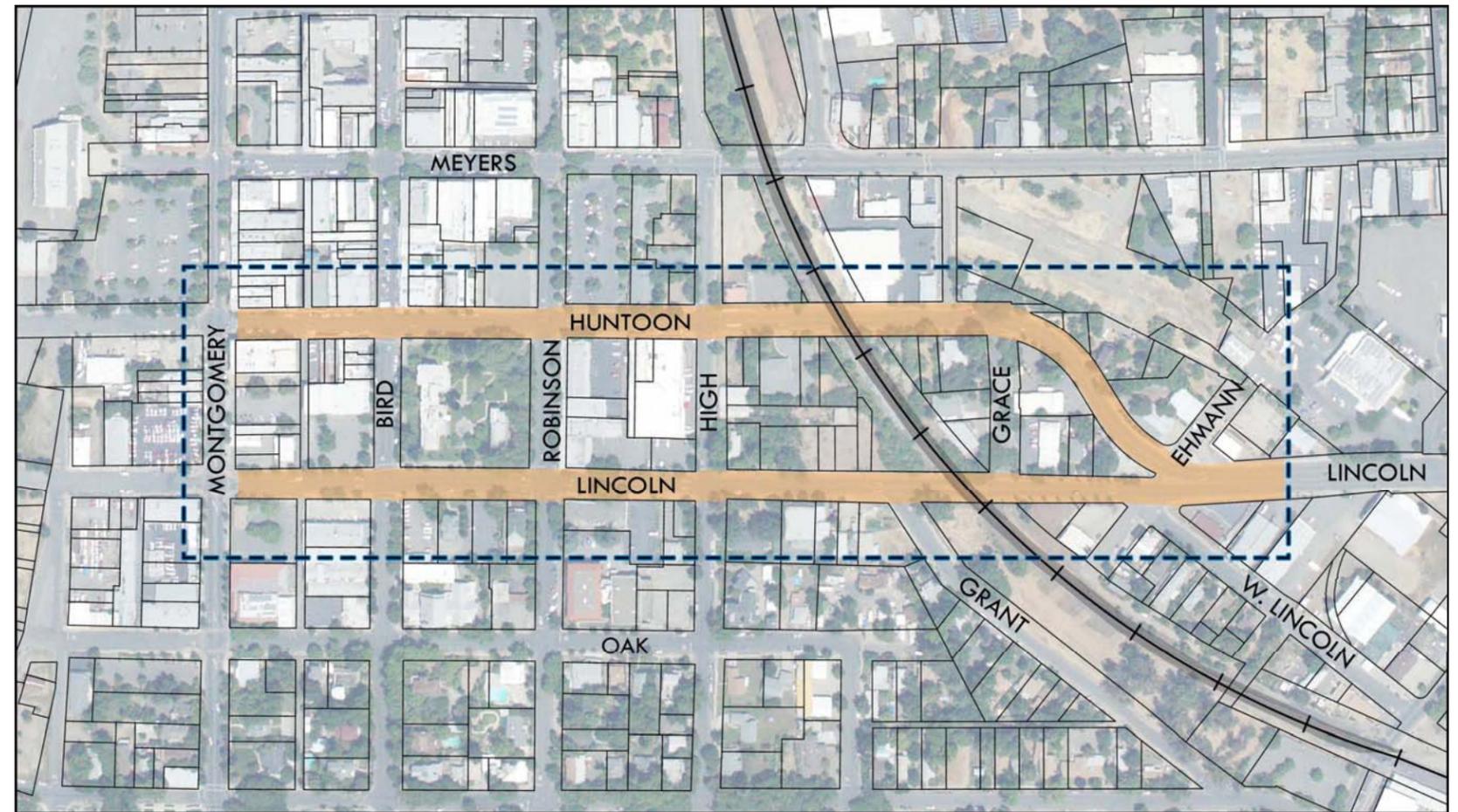


Figure 1 – Project Boundary

Existing Conditions

Regulatory

Over recent years, many planning documents have been prepared and/or updated to address the goals and opportunities of the Downtown area. Since Lincoln and Huntoon Streets are located in the heart of Downtown, the importance of incorporating relevant information is understandable. These plans address Land-Use, Community Design, Circulation and Traffic and Downtown Redevelopment. It's important that this Streets Restoration plan is consistent with these plans and builds on the information relative to this study.

City of Oroville planning documents relevant to this study:

- ❖ City of Oroville General Plan
- ❖ Zoning Code
- ❖ Oroville Waterfront Concept Plan

General Plan Elements

Much of the background information presented and analyzed in this plan has been borrowed from the City's recently adopted General Plan. As the City's chief planning tool to implement the Communities goals toward growth and development, this study recognizes the importance of this document and approaches the Lincoln and Huntoon Streets Restoration in a manner consistent with its goals. Elements in the General Plan address Land-Use, Community Design, Circulation and Traffic. The following two pages of this section outline goals and policies of these elements that are relevant to this study.

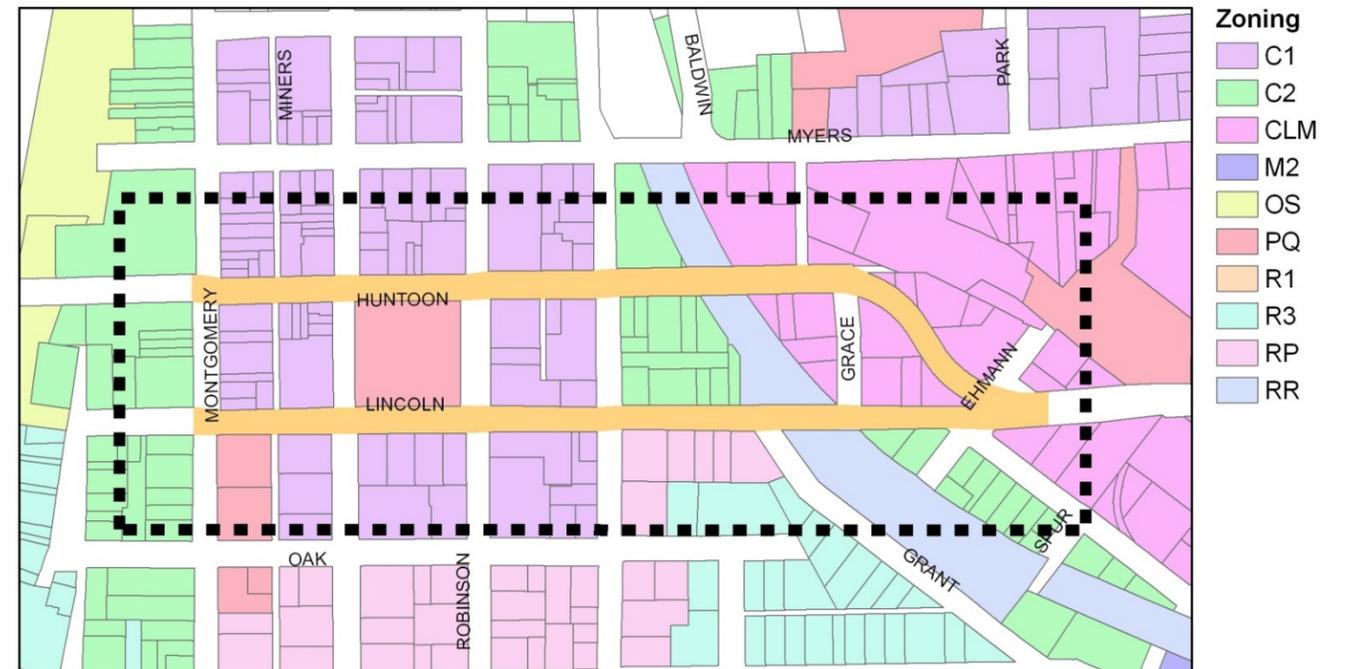


Figure 2 - General Plan Land Use Designations

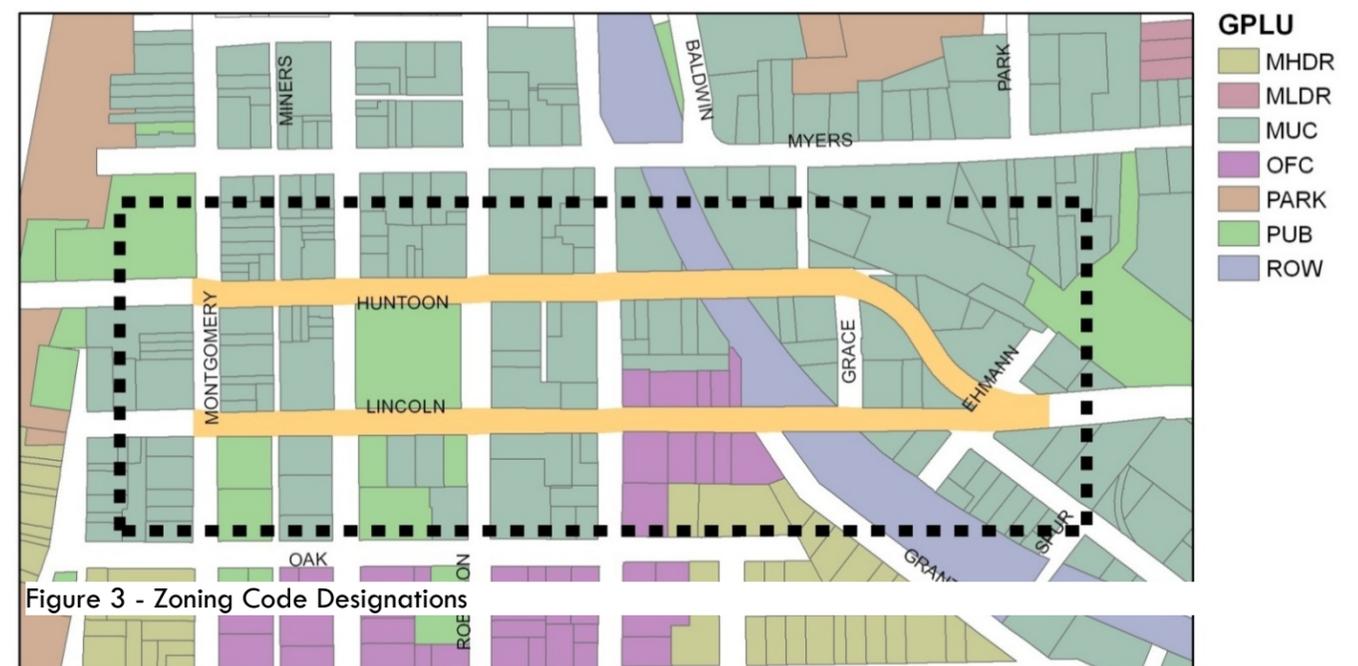


Figure 3 - Zoning Code Designations

The Land-Use Element

Goals

Goal LU-2: Develop an economically vital, pedestrian-oriented Historic Downtown that includes retail, office, residential, civic, cultural and recreational uses.

Policies

P2.1 Preserve and enhance the Historic Downtown and its adjoining historic residential neighborhoods.

P2.2 Promote development that maintains and reinforces the Historic Downtown as the geographic and economic center of Oroville.

P2.3 Encourage the addition of housing and visitor accommodations within walking distance of Historic Downtown.

P2.4 Encourage concentration of local-serving offices in and near Historic Downtown.

P2.5 Encourage the location of businesses, services and civic facilities in Historic Downtown that provide entertainment, visitor services and cultural enrichment and extend the hours during which Historic Downtown is an active place.

P2.6 Encourage restoration and reuse of historic Downtown buildings.

Actions

A2.1 Work with the Downtown Business Association to develop an on-going program to market the Historic Downtown to residents and visitors alike using, for example, the State Theater, the Farmers' Market, directional signs, cooperative advertising and promotional events.

A2.2 Create a Historic Downtown housing program, possibly using Redevelopment Area revenue and funds from the Federal Community Development Block Grant program.

A2.3 Work with Historic Downtown property and business owners to establish a downtown Business Improvement District (BID) that would help fund the continued implementation of the Downtown Plan. Improvements that could be funded by a BID include façade improvements, street trees, street lighting, banners, and sidewalk/paving improvements. A BID could also fund advertising and promotion for the Historic Downtown and its businesses.

A2.4 Work with Downtown Business Association and Oroville Chamber of Commerce to prepare a Strategic Plan for the Historic Downtown Area. As part of the plan, identify gaps in available merchandise and services and recruit experienced vendors who would like to relocate to Historic Downtown Oroville.

A2.5 Develop and implement a capital improvement program to upgrade the Historic Downtown's physical infrastructure, such as sidewalks; curbs; water; sewer and drainage facilities; and parking facilities.

A2.6 Conduct a feasibility study regarding the installation of data conduit or a wireless system in the Historic Downtown to allow for high speed internet access, and install such a system if feasible.

The Community Design Element

Goals

Goal CD-5: Establish the Historic Downtown Business District as the "Heart of the City" focusing on its unique historic, civic, cultural and natural amenities.

Policies

P5.1: New development in the Historic Downtown shall include human-scale details in the design of buildings, such as windows on the street, awnings, and architectural features that create a visually interesting pedestrian environment. Blank walls adjacent to pedestrian circulation areas are prohibited. Entryways shall be oriented to provide direct access to the sidewalk. Additional setbacks shall be allowed where appropriate to provide for pedestrian spaces such as plazas, outdoor café seating areas and entry nooks.

P5.2: Utilize coordinated landscaping, plantings and distinctive street lighting to clarify the routes leading to Historic Downtown.

P5.3: Support the maintenance of Montgomery Street as the primary commercial and civic street within the Historic Downtown.

P5.4: Encourage a diversity of uses in the Historic Downtown, including commercial and civic, that will ensure a lively day and evening presence and reinforce the unique qualities of the Historic Downtown as Oroville's community center.

P5.5: Ensure that the scale and mass of new development is compatible with the historic character of the existing Historic Downtown.

P5.6 Encourage the preservation, restoration, rehabilitation, reuse and maintenance of existing Historic Downtown buildings.

Actions

A5.1 Conduct a study as to the feasibility of a new bridge(s) across the Feather River to the Historic Downtown.

A5.2 Install "Historic Downtown Oroville" signs along Highway 70, Oroville Dam Boulevard and Montgomery Street.

A5.3 Continue to explore the development of new publicly owned civic spaces on vacant and underutilized Historic Downtown properties, or utilization of such properties for temporary activities such as displays of public art or community events.

A5.4 Prepare and adopt Historic Downtown Design Guidelines to ensure architecture and character of the Historic Downtown is preserved and enhanced.

General Plan - Circulation Element

Goals

Goal CIR-6: Provide a bicycle network to encourage bicycling for both transportation and recreation.

Policies

P6.1 Establish Oroville as a bicycle center for Butte County by providing a comprehensive system of Class I bicycle paths, Class II bicycle lanes and multi-use recreational trails throughout the Plan Area, and particularly to connect residential neighborhoods, the Historic downtown, and the Feather River.

Zoning

DH-O: Downtown Historic Overlay

Parking

J. Parking Requirements in DH-O Districts. Notwithstanding any other provision of this section, in Downtown Historic (DH-O) overlay districts, the following minimum parking requirements shall apply:

1. For single-family residential uses in a DHO district, no parking spaces shall be required, provided that all of the following circumstances exist:
 - a. No off-street parking spaces have already been constructed on the property.
 - b. The property qualifies as a landmark, as provided in Section 26-50.040 of this chapter.
2. Residential uses in a DH-O district shall be eligible for the on-street parking credit described in this section.
3. In any RP/DH-O district, all required parking spaces shall be located within the building's rear setback.

K. Parking Requirements in the Downtown Parking Assessment District. In the area known as the "Downtown Parking Assessment District," as shown on the Zoning Map, no off-street parking spaces shall be required.

L. On-Street Parking Credits.

In nonresidential districts, and for residential uses in a Downtown Historic Overlay (DH-O) district, the following on-street parking credit shall apply:

1. Where the entirety of a marked, on-street parking space or bicycle parking space is adjacent to a particular site, the on-street parking space may be counted towards any off-street parking requirement for that site.
2. Where a parking plan includes access driveways or curb cuts that would cause one or more marked, on-street parking spaces or bicycle parking spaces to be eliminated, the off-street parking requirement shall be increased by the number of on-street parking spaces that are to be eliminated.

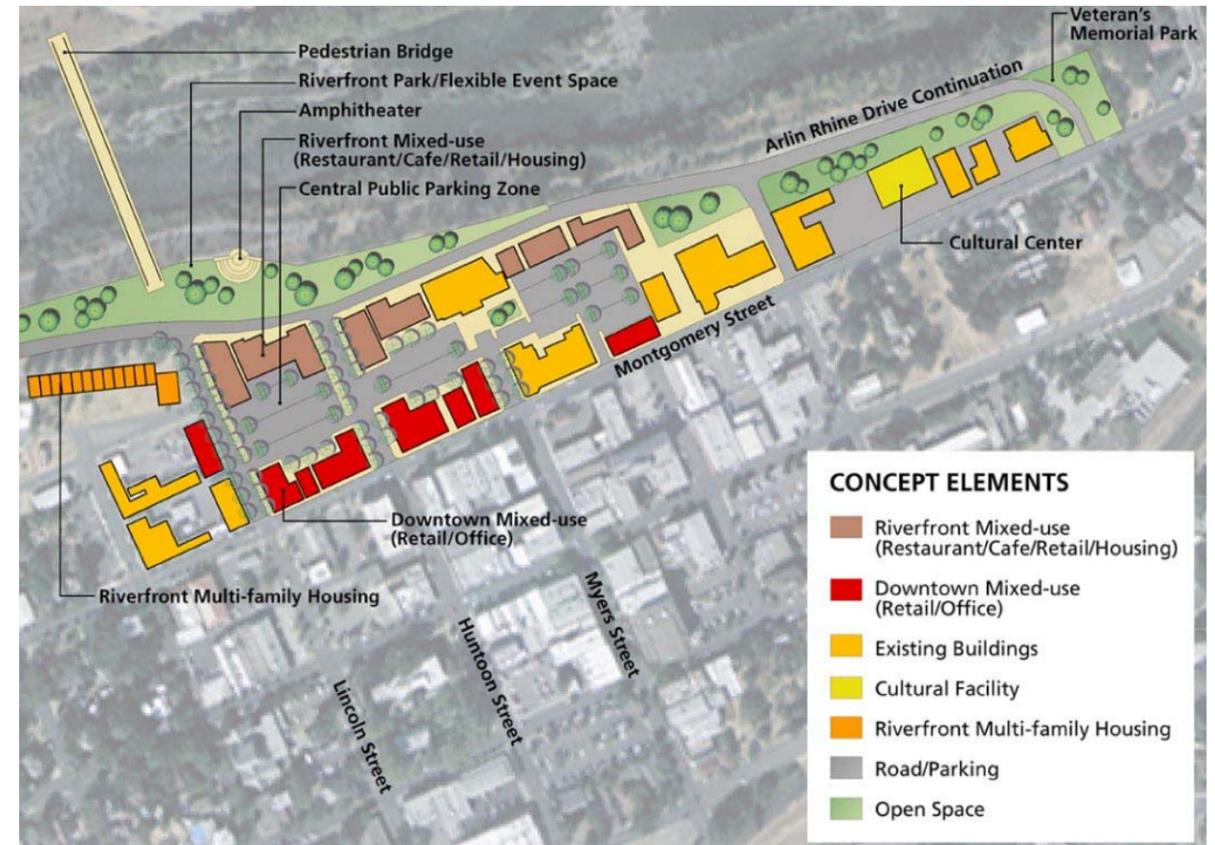


Figure 4 – Exhibit from 2004 River Front Master Plan

River Front Master Plan

The Oroville Waterfront Concept Plan was prepared for the Oroville Redevelopment agency in 2004. The plan aspires to maximize the many opportunities offered by the Feather River and capitalize on the recreational potential of the region to the benefit of downtown Oroville and the greater Oroville community.

The river, especially as it flows through the downtown area, is a unique natural resource and a high quality amenity around which recreational, commercial and residential types of redevelopment can occur. Existing and proposed regional recreational resources further enhance the potential for Oroville's economic development. Thus, this Concept Plan proposes how the City can take advantage of these multiple resources by recommending public space improvements along with recreational and redevelopment opportunities.

One key element of the plan relevant to this study is a pedestrian bridge across the Feather River at the northern terminus of Lincoln Street.

Existing Traffic Flow

Figure 5 identifies the direction of existing traffic flow within the project area and immediately adjacent.

As depicted, Huntoon St and Lincoln St. make up a “one-way couplet”. Together the couplet serves as the main North/South route linking southern Oroville to the downtown area.

Montgomery Street serves as the main East/West route connecting west Oroville to the downtown area and a key linkage from SR 70 with an on/off ramp at the overpass. Bird, Robinson, High and Grace Streets are collector roads that serve to move traffic from local streets to arterial roads.

Existing Truck Routes

As identified in the City’s General Plan, Lincoln and Huntoon Streets serve as a truck route for delivery of goods into the downtown area. All other routes are discouraged.

Proposed Truck Routes

If Lincoln and Huntoon Streets are restored back to their original bi-directional flow, Lincoln, classified as an arterial road will serve as the new truck route.

Existing Roadway Classifications

As classified in the City’s General Plan, Lincoln and Huntoon Streets are “arterial roadways”. They serve as a major corridor linking the downtown area to southern Oroville.

Proposed Roadway Classifications

With the proposed bi-directional restoration, classifications will be slightly modified to suit the new traffic conditions. Huntoon Street, with its higher pedestrian activity, reduced traffic speeds and more downtown feel will be downgraded from an arterial to a collector. Lincoln Street will remain an arterial connection to and from the downtown area.

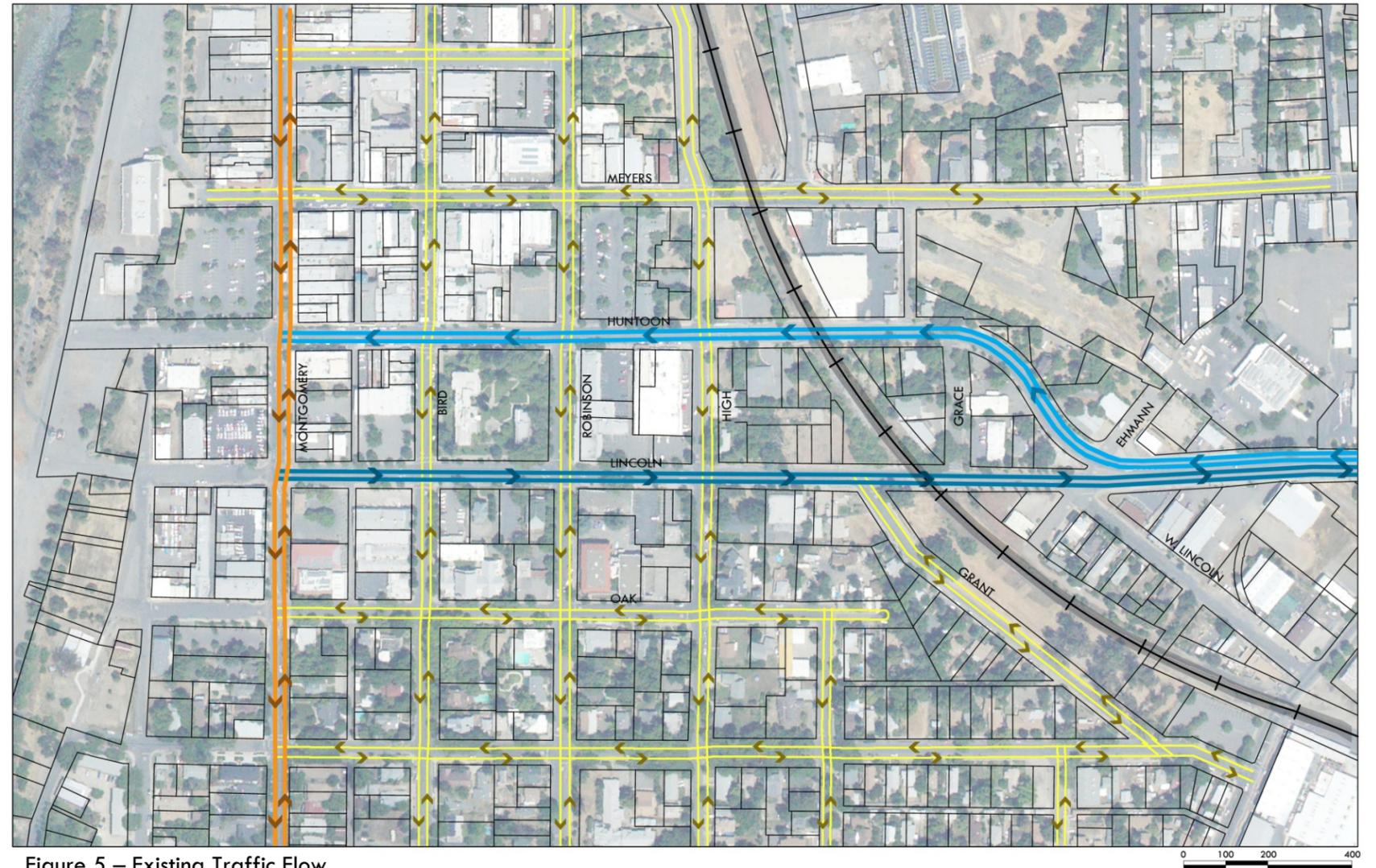


Figure 5 – Existing Traffic Flow

Existing Right of Way

There are many different cross sections that currently exist throughout length of the Lincoln and Huntoon Streets project area. Some locations have landscaped parkway strips that separate wide sidewalks from the street while other locations have narrow sidewalks immediately adjacent to the street.

A variety of other combinations also exists resulting from decades of inconsistent development and lack of a Downtown Master Plan. In some locations, sidewalks at road crossing do not align. A goal of this plan is to provide a road way section that meets the capacity and design requirements of each street. Ideally, a consistent roadway section could be used throughout the length of the project area, however, constraints at certain locations may require a variation of the preferred cross section.

Public Transit

B-line route 25, serving the downtown area, runs from west to east along Robinson Street crossing both Lincoln and Huntoon Streets. See Figure 6. A bus stop is located at the public parking lot between Huntoon and Meyers Streets. The route west of the stop is an area of flag stops meaning that riders may flag a bus for a ride. All proposed concepts for this study will be designed to allow bus and fire truck access.

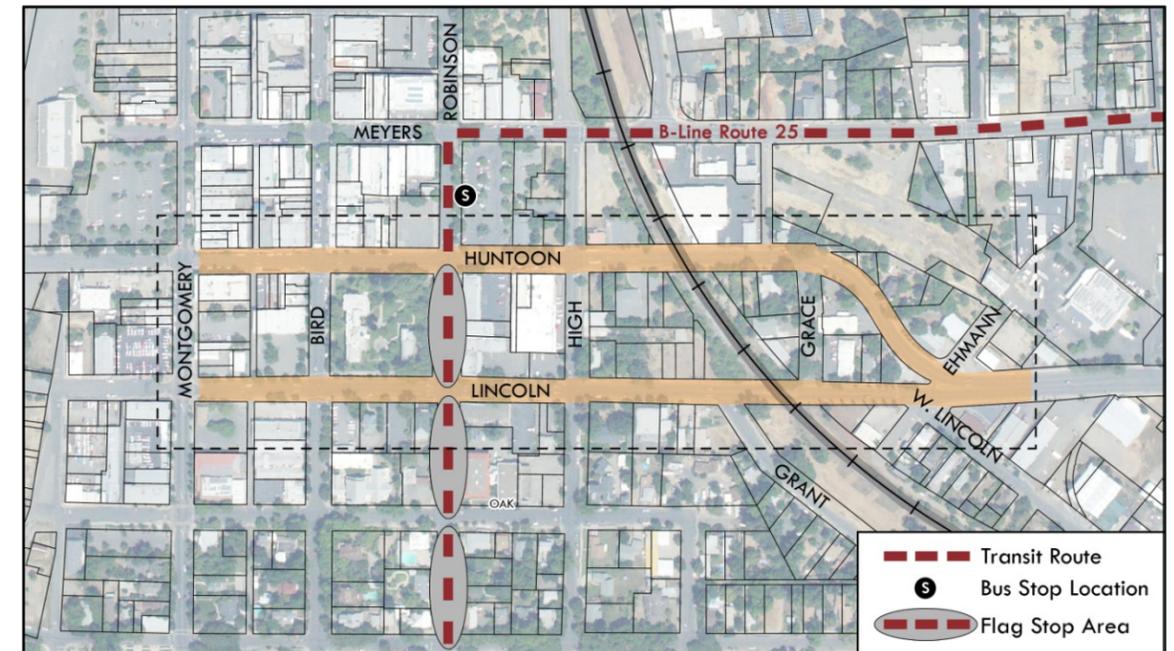


Figure 6 – B-Line Bus Route

Bicycle Routes

There are currently no existing designated bicycle routes through the project area. The City of Oroville 2009 Draft Bicycle Transportation Plan does designate two Class II Bicycle Routes. See Figure 7. Bicycle circulation in the north/south direction is proposed on Meyers Street and east/west route on Robinson and High Streets.

Existing right of way space and the need for parking limit a designated bike lane for Lincoln and Huntoon Streets. In order to accommodate a single bike lane, one row of parallel parking would need to be removed or a combination of reduced median, driving land and parking width.

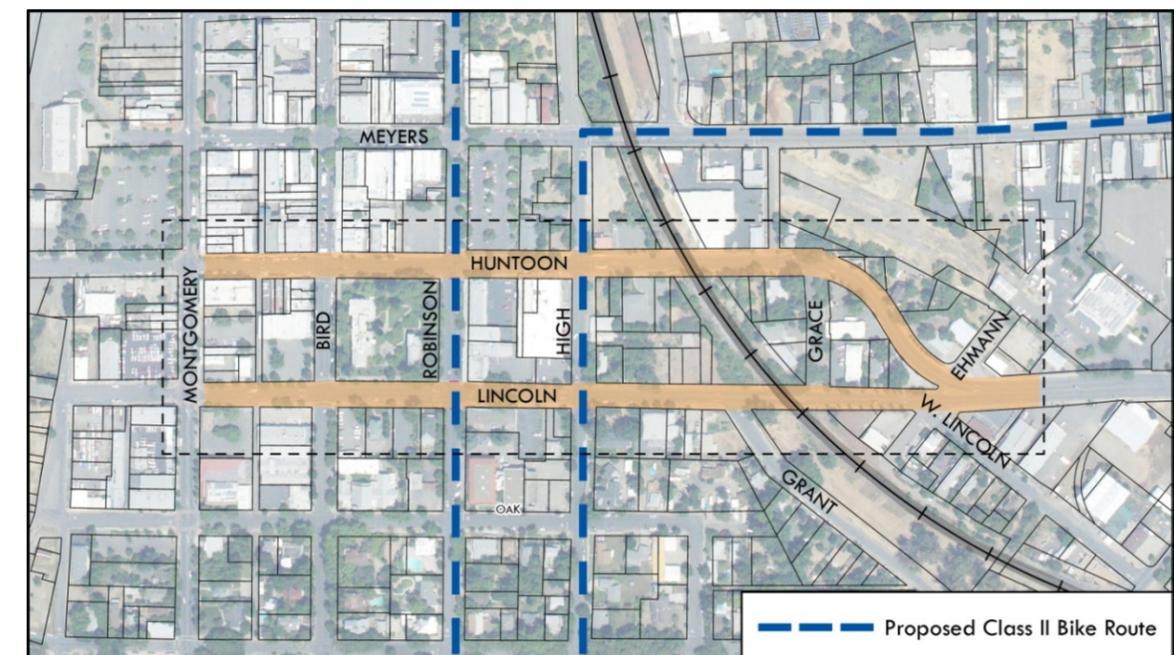


Figure 7 – Proposed Bicycle Route

Existing Utilities

As typical to most downtown areas, many utilities are located on or around street corners and intersections. Many of the proposed improvements in this plan will require adjustments and/or relocation of existing utilities. The plan generally addresses utilities as they relate to the location of proposed improvements.

It is not within the scope of this plan to address capacity or other types of utility issues. Utility improvements generally consist of the relocation and/or upgrade of storm drains and street lights.

Storm Drain System

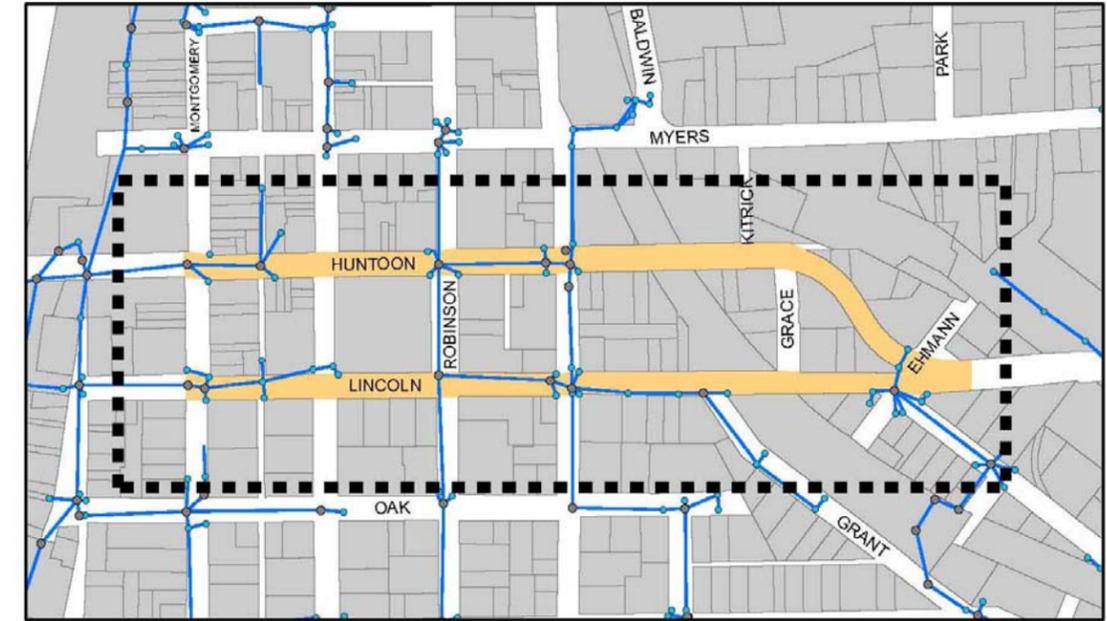
Figure 8 depicts the existing storm system serving the project area. This system currently meets present and future capacity needs of the area. Storm water collected in the system is dispelled in to the low-flow channel of the Feather River.

The proposed curb and sidewalk improvements along both Lincoln and Huntoon streets will require that most of the existing storm drain inlets to be relocated.

The most significant adjustment to the system would occur at the Ehmman and Lincoln Streets intersection to accommodate a new roundabout.

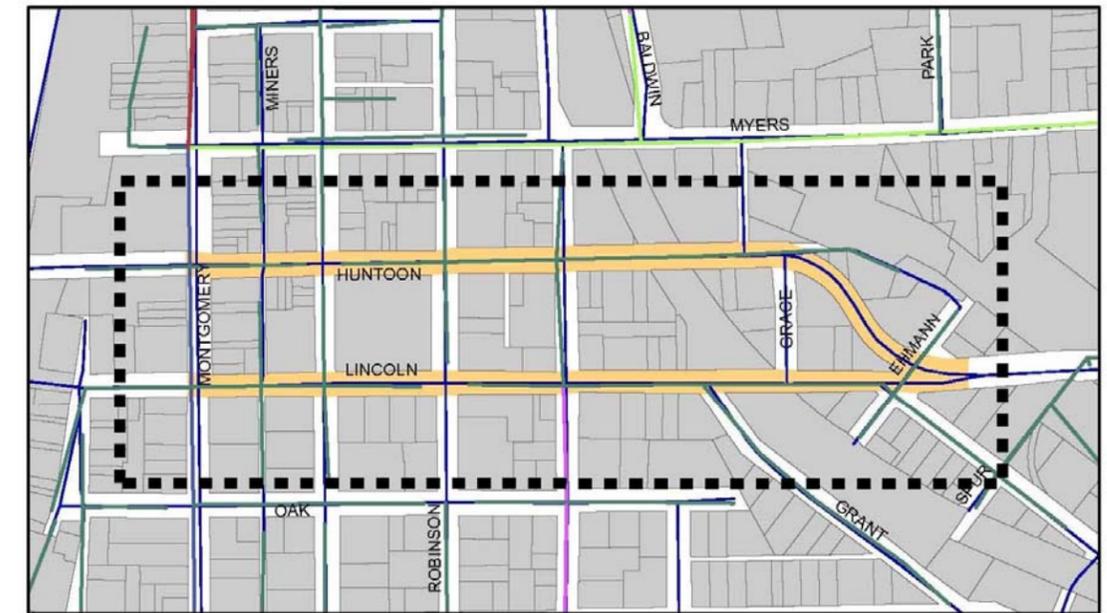
Sanitary Sewer System

As shown in Figure 9, sanitary sewer lines are located the entire length of the project. At this point, there are no changes foreseen to the sanitary sewer system.



- Storm Drain Manhole
- Storm Drain Drop Inlet
- Storm Drain Pipe

Figure 8 – Existing Storm Drain System



- Sanitary Pipe Diameter**
- 6
 - 8
 - 10
 - 12
 - 18

Figure 9 – Existing Sanitary Sewer System

Existing Lighting

Figure 10 locates and identifies all street lighting in the project area. As the figure illustrates, there are several pole styles located with irregular spacing. The majority of street lighting is mounted to multi-utility wooden poles. While lighting in this manner is sufficient for travel and public safety, it misses an opportunity to provide a strong and distinguished identity at the gateway, along the corridors and in the downtown area.

Decorative lighting is recommended throughout the project area at regular spacing. The objective is to line these key corridors with historic style lighting that will match existing areas of downtown and introduce a sense of cohesion and history.

This also offers an opportunity to light the gateway to downtown and provide a strong identity consistent with goals specific to downtown. This can be achieved with the use of decorative pole styles and regular spaced decorative street lighting.

Additional lighting will occur as accents to illuminate signs and monuments at the intersection of Lincoln and Ehmann Streets, where the roundabout is proposed as a new entry to Historical Downtown Oroville. Electrical connections could also be provided at landscape medians and bulb outs for seasonal street tree lighting throughout the downtown area.

Existing Hydrants

Figure 11 identifies the existing fire hydrants in the project area. Only one hydrant at the corner of Ehmann and Lincoln Streets will need to be relocated since it conflicts with the roundabout design at the Lincoln/Ehmann intersection. No additional hydrants are recommended and those at all other locations may be retained.



Hydrant at the Lincoln/Ehmann Intersection

Figure 10 – Existing Lighting



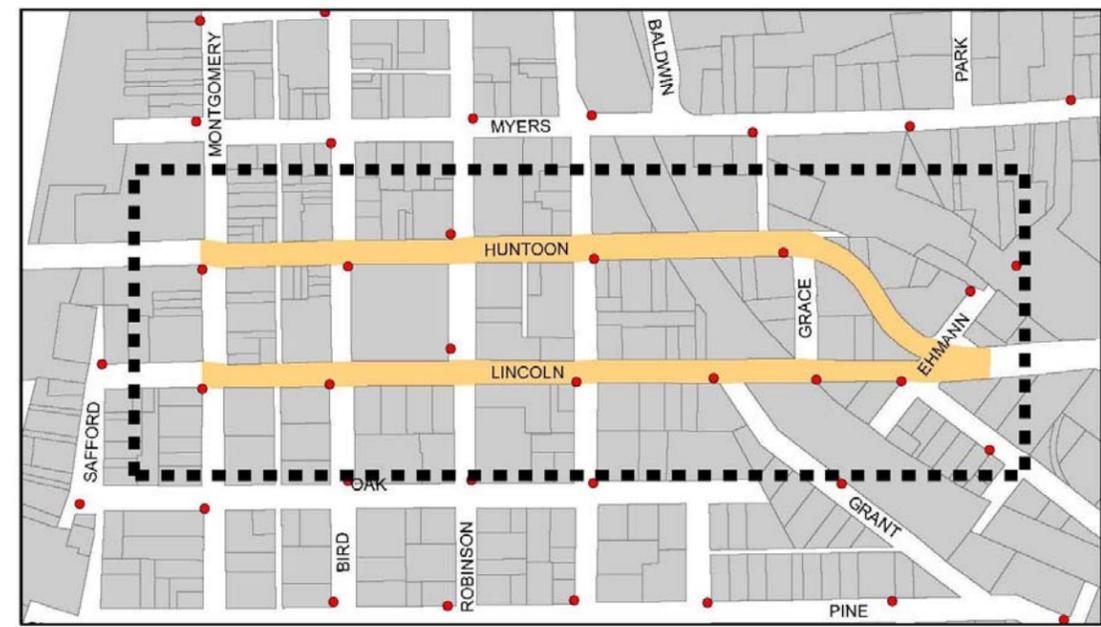
Pole Style

- Decorative
- Galvanized Steel
- Spun Aluminum
- Wood



Street lighting mounted on a multi-utility pole

Figure 11 – Existing Hydrants



- Hydrants

Existing Character

The existing character of the project area is divided into four categories:

- ❖ High Pedestrian Activity
- ❖ Medium Pedestrian Activity
- ❖ Low Pedestrian Activity
- ❖ Very Low Pedestrian Activity

High pedestrian activity areas

High pedestrian activity areas are generally characterized by high-density retail and commercial uses. Businesses are typically arrived at by vehicle, bicycle, public transportation and by walking. Pedestrians in these areas tend to stay longer, patronize several businesses and spend more time socializing along the street. It is this higher pedestrian activity area that will benefit with the addition of benches, planters and pedestrian scale lighting.

Medium pedestrian activity areas

Medium pedestrian activity areas are generally characterized by medium to low-density office/commercial uses and are often destination specific. Businesses are typically arrived at by vehicle and often provide off street parking. Pedestrian movement in these areas is usually limited between parking areas at specific businesses.

Low pedestrian activity areas

Low pedestrian activity areas are generally characterized by office and residential uses. There are several vacant office buildings and vacant lots throughout this area.

Very low pedestrian activity areas

Very low pedestrian activity areas are generally characterized by industrial and commercial uses and are destination specific. Businesses are typically arrived at by vehicle. Roads and sidewalks in these areas typically serve as thorough fares linking southern Oroville to the Downtown area.

See Figure 13 on the following page for an illustrative graphic of pedestrian activity areas.

Existing Landscape

Figure 12 identifies existing landscape in the project area. Existing landscape primarily consists of parkway planters and singular tree planters, or tree wells. Parkway strips are on average four-feet wide and include sporadic street trees and sparse ground cover or shrub plantings.

As shown in the Streetscape section of this Restoration Plan, additional street trees are proposed in between existing trees and brick pavers are proposed in parkway planters that will now be next to new parking stalls.

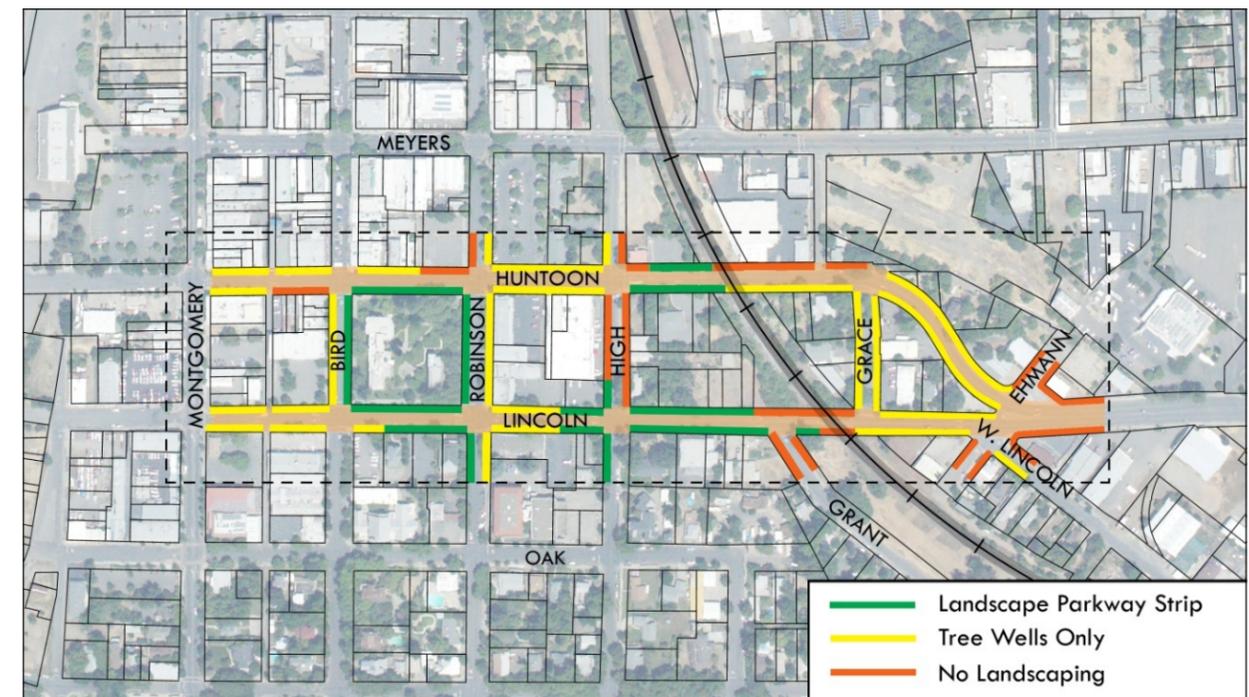


Figure 12 – Existing Landscape

Lincoln & Huntoon Streets

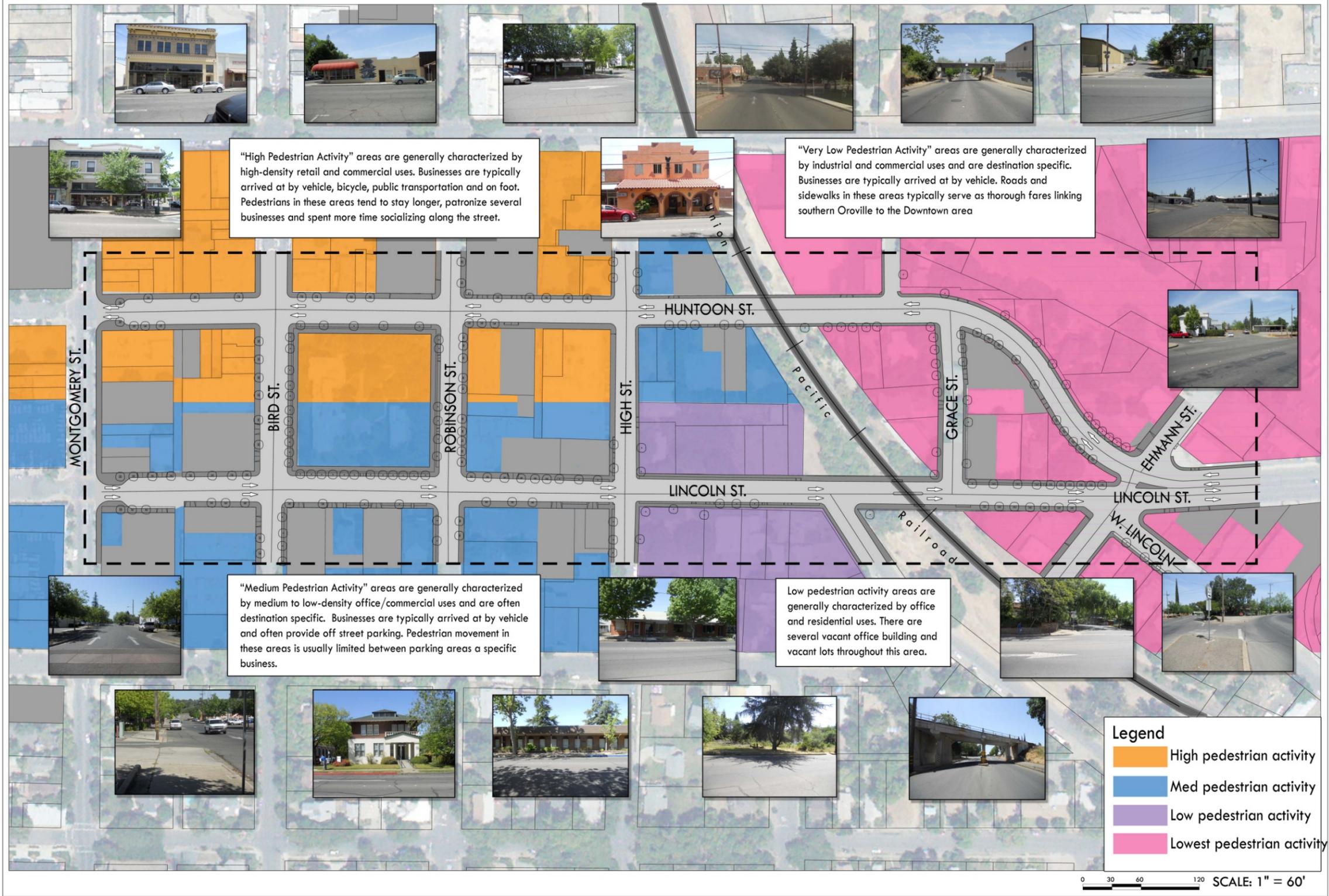


Figure 13 – Pedestrian Activity Areas

Traffic Planning Concepts

In reference to downtown intersections to Lincoln and Huntoon Streets, there are two feasible choices with respect to potential cost of improvements and staying within the existing Right of Way (ROW). Both options include a roundabout at the intersection of Lincoln and Huntoon Streets, at the south end of the project boundary.

Option A - Stop Control - Stop control via signs or red flashing beacon lights or

Option B - Mini Roundabouts

Signalization would require ROW takes and grade separations, which are not feasible.

Each of the two options stays within the ROW and provides good options for this project. We feel the roundabout option would provide the best flow, however would be slightly more costly and would require more education to the community for buy-in and proper use of roundabouts.

Option A - Stop Control – Montgomery Street to Grace Street

Stop control is fairly self explanatory and understood by the public. As an option within this alternative, the stop control could be Two-Way Stop; through traffic on Lincoln and Huntoon with side street stop control or All-Way Stop at each intersection, just add another stop sign and a stop bar on the main streets. Two-Way Stop may seem like a safer alternative for traffic, it does promote higher speeds, less driver attention to side streets, less driver attention to businesses and less pedestrian/bike safety.

The Stop signs could also be Yield signs; an option within this alternative, but it does not need to be a stand alone alternative since the difference is just a sign (but should be mentioned as a viable solution). The crosswalks at the stop or yield controlled intersections could be close to the intersection (typical) or pulled back to allow more public space (usable concrete or beautifying landscape). Both options are shown in Figure 14. A significant number of "breaks" in the median would be required (no median in many locations) for access in and out of driveways along all streets since no u-turn capabilities are available at the intersections. This degrades the overall feel of the project area significantly if the goal is to make a better sense of "place" in downtown to promote business activity and people presence.

Although Two-Way Stop control may seem prudent along Lincoln and Huntoon for improved main street capacity for through traffic and local drivers, safety suffers significantly and side street traffic would be severe (impacting side street businesses and increasing driver frustration of accessing side streets). The overall feel of the project area will be dictated by the traffic on the two main corridors, thus playing down businesses on side streets and lack of through traffic wanting to slow, stop, or turn and explore any new businesses or the project area. All-Way Stop control seems a better option for both safety and businesses, but will frustrate through traffic with stop-go-stop-go for the entire length of the corridors, thus potentially creating through traffic to avoid the downtown area all together which is of course not good for business promotion. All way stop control is also an issue for Emergency Services and related public safety.

Two-Way and Four-Way Stop Options

- One approach could be to install four-way stops at Robinson and Bird Streets and two-way stops at all other cross streets.
- This approach reduces capacity / traffic flow. The layout could maintain flow north to south with only side street stops but this will increase the speed of traffic through downtown.
- Stop signs could create undesirable stop and go traffic and increase the potential for accidents.
- Yield signs are an option but can be less safe as they are often ignored if not used with a roundabout

- Bulb outs on corners will help create narrow streets with smaller and safer crossing distances for pedestrians.
- The medians will also help slow down traffic, however, the through traffic will be faster and intersections more dangerous with two-way stop options.
- Stop and go traffic could also increase vehicle emissions and be less desirable to pedestrians.
- Economically it is preferred to stop at all streets to allow for viewing of businesses
- Aesthetically both options are close to the same as long as there is a median.

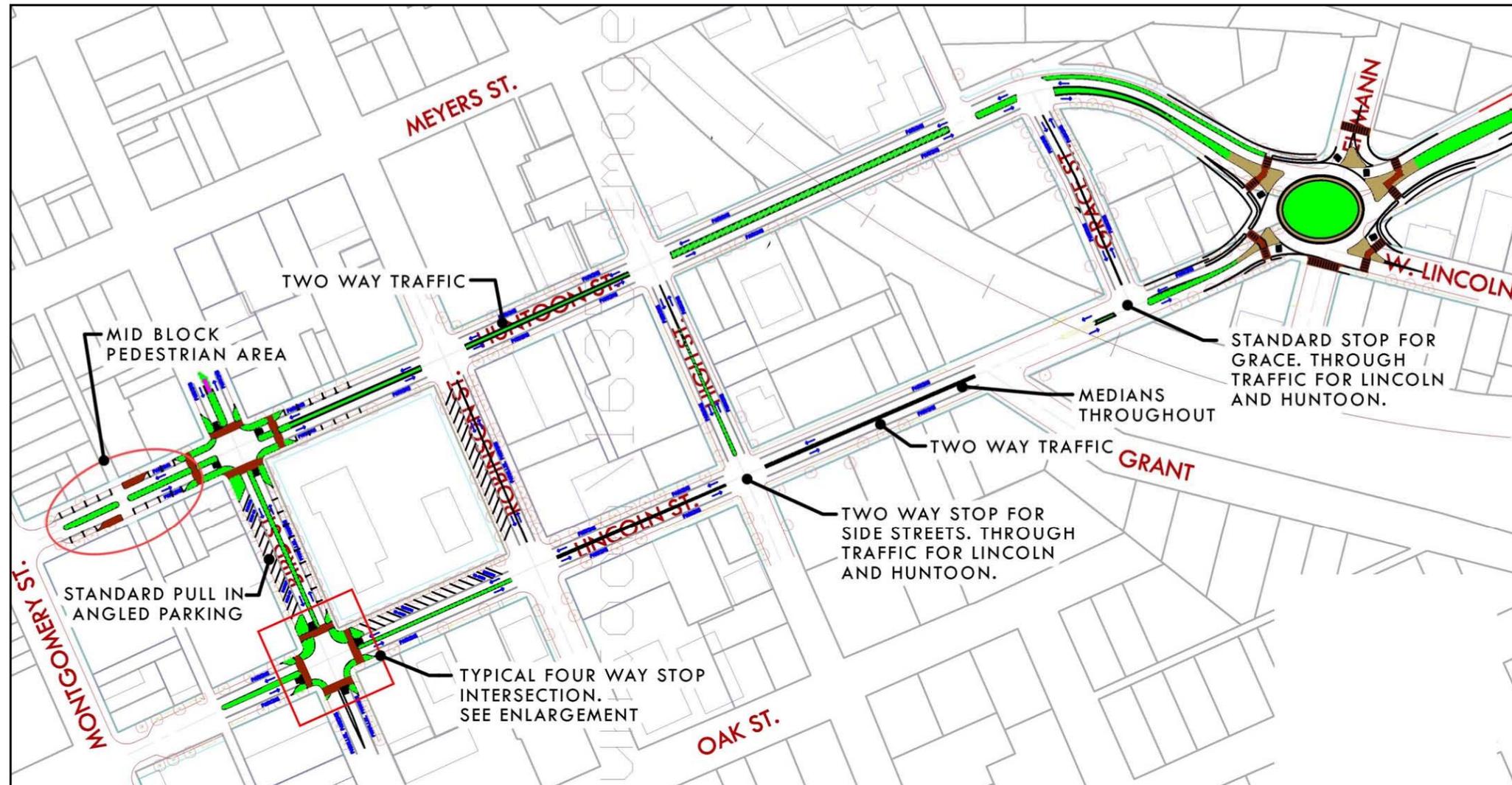


Figure 14 – Option A – Stop Control Concept Plan

Cross Street Options – East to West – Bird, Robinson, High and Grace

- Two-way traffic:
 - a. Single 11' Lane - Traffic friction slows traffic, safer streets, ease of viewing, ease of crossing
 - b. Median with and without landscape (2' - 7' wide planters), breaks in the median will be provided as needed for driveway and cross street access.
 - i. Enhanced aesthetics, low maintenance landscape, trees for shade, art in landscape and accent lighting
 - ii. Select and prune trees for clear views of retail and out of drive isle.
 - iii. Beautification of corridor with colored paving, signage, site furniture, pedestrian friendly seating areas and art
 - c. Clear line of site at all intersections for safety (Low landscape or hardscape)
 - d. Protected pedestrian Two Stage Crossing – safety, comfort, decorative paving

- Parking: Cross streets increase parking in down town
 - a. 10 to 12 spaces added with additional space for landscape
 - b. Parallel parking on south side of street (8' wide) on Bird and Robinson with High and Grace being parallel parking on both sides of the street.
 - c. **Standard Pull-in (angled) parking** for North side of Bird and Robinson along with Lincoln between Bird and Robinson. Adding these areas will increase parking.
 - d. **Oblique “back in parking”** instead of pull-in provides a safer parking space for exiting out of the parking space. This concept is gaining popularity with drivers and advertising and educating the general public about “back-in” parking will be necessary. Back in parking does provide a simpler departure into traffic and a better view of pedestrians. Getting into the space is very similar to parallel parking. See Figure 16 for an example layout of back in parking
 - e. Parking concepts will be altered to accommodate access point for buildings and parking lots.

- Pedestrian areas:
 - a. Corner bulb-outs, sidewalk seating and open line of site
 - b. Cross walks in front of or behind Stop Bar - See Figure 11
 - c. Midblock pedestrian area (demonstrated on Huntoon between Bird and Montgomery. – replace parking for pedestrian use and user amenities.
 - i. Site furniture; display for retail shops, kiosks, interpretative panels, café seating, lighting, trash and recycling containers.
 Bicycle routes: unfortunately with the space we have in the ROW it is difficult to provide a bike route through the project without either eliminating medians or changing all parking to parallel. With the changing ROW we could provide some bike path but it would not be consistent throughout the project.

- Aesthetics:
 The landscape in combination with decorative paving and site furniture will provide a pleasing environment for pedestrians and drivers alike. New tree planting will create more shade and an upper canopy, making the streets feel smaller and more comfortable. See page 16 for a visual Before and After graphic of an example intersection.

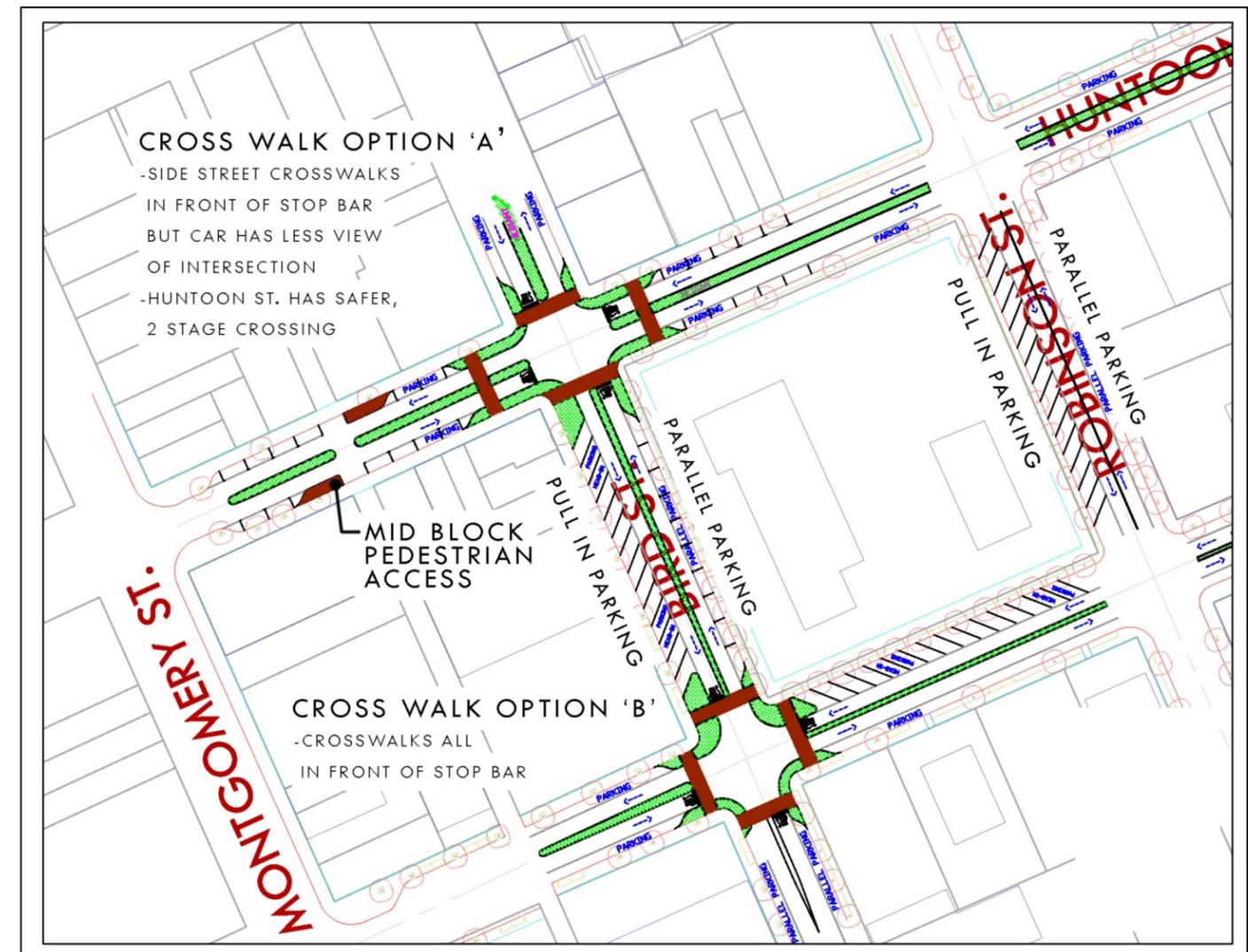


Figure 15 – Cross Street Parking and Landscape

Option B - Mini Roundabouts – Montgomery Street to Grace Street

Mini roundabouts offer greater Capacity and Safety than stop control (statistically) while still within the ROW constraints (cost). With respect to capacity, a slow and steady flow of traffic is significantly superior for roadway capacity and adjacent business access than a required stopping of traffic (up to a 75% reduction in delay at the intersection compared to stop control). Hence, there are no capacity concerns with the mini option.

The minis also allow better accessibility and mobility for vehicles on all streets since u-turns are easy and available. Nearby residents, driveways and business accesses have a controlled corridor with full medians with the u-turn capabilities at the intersections, not to mention the obtained downtown environment with improved aesthetics on most streets, especially on Lincoln and Huntoon.

Large vehicles such as vans, RVs, buses, and delivery trucks with trailers up to a forty-foot wheel base can maneuver easily through mini-roundabouts as though traffic.

In the case of left hand turns; forty-foot wheel base vehicles will need to roll over a small portion of the center island. Trucks with a fifty-foot wheel base and above should alter their route if left hand turns are necessary.

Mini-roundabouts will also function well with existing bus routes as they travel east and west on Robinson.

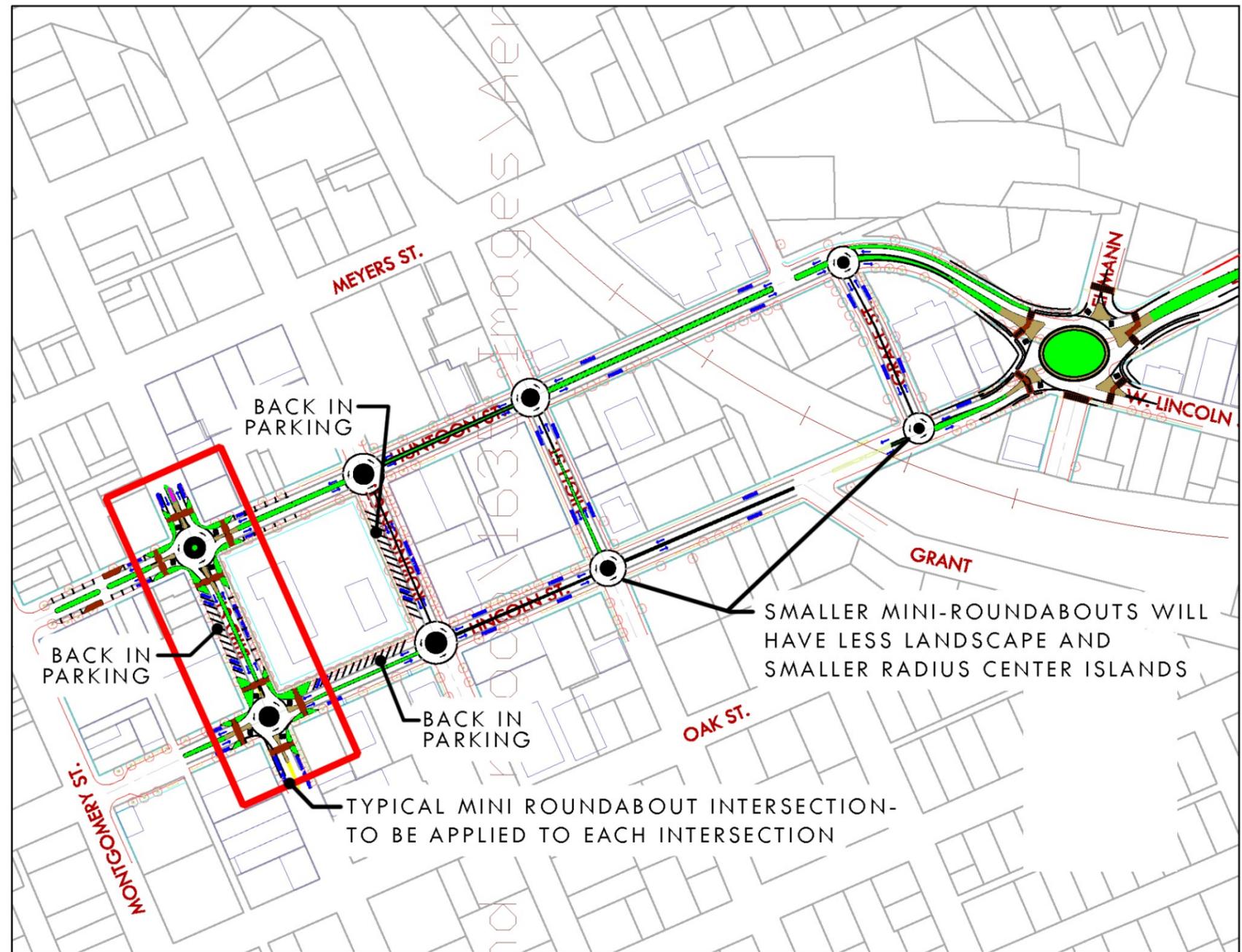


Figure 16 – Option B – Mini Roundabouts

Mini Roundabouts - Safety and Capacity

With respect to safety, mini roundabouts will reduce turning movement conflicts by having everyone make a right turn around an object (statistically showing 80% reduction in injury accidents vs. stop signs) reducing 32 vehicle to vehicle conflicts down to only 8 vehicle to vehicle conflicts.

Minis would have an overall "smoother" and cohesive environment to the entire project area for all mode users and businesses opportunities alike while still achieving an inviting, pleasing atmosphere for a new downtown Oroville. This may be the most important aspect the mini roundabout option has to offer as it is the goal of this project.

Benefits of Modern Roundabouts

- Lives Saved – Major Reduction in Injury and Fatal Accidents
- Reduced Travel Delays and Congestion
- Enhanced Pedestrian Safety
- Reduced Intersection Speeds
- Reduced Environmental Impact Noise Levels
- Reduced Vehicle Emissions
- Reduced Fuel Consumption
- Provided Traffic Calming
- Red-light Running Incidence Eliminated
- Increased Intersection Capacity
- Faster Overall Roadways Travel Times
- Less Right-of-Way Needs, Construction and Maintenance Costs
- Opportunity for Community Aesthetic Enhancement
- Traffic Calming – Crashes that do occur tend to be minor because of slower speeds

Additional information may be obtained by contacting the:

- Insurance Institute for Highway Safety at www.iihs.org or
- The Federal Highway Administration at www.fhwa.dot.gov and
- Roundabouts & Traffic Engineering at www.roundabouts.us



Example Mini Roundabout

- Increased pedestrian accessibility with truncated domes in yellow
- Excellent landscaping in median/planters with no sight distance restrictions
- Street lighting where appropriate only (On approaches to roundabouts)
- Excellent access management for businesses and traffic congestion



Mini Roundabout
At Smaller Intersections



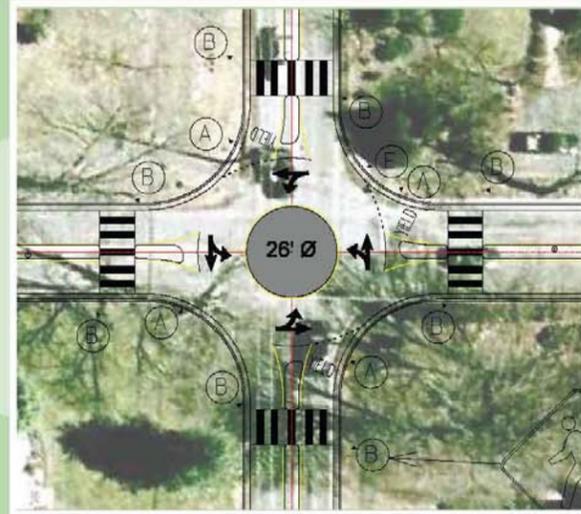
Mini Roundabouts – Ease of Bus and Fire Truck Traffic

BEFORE Mini Roundabout



AFTER Mini Roundabout





Aerial View (24 ft pavement)

Application Criteria

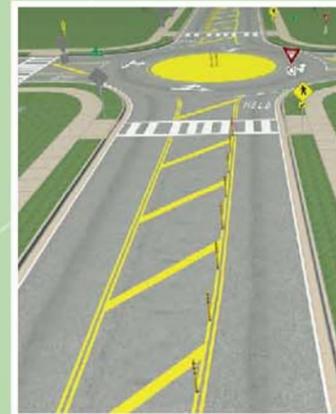
- Lower speed roads (max 35 mph).
- Total entering intersection volumes from all approaches less than 1,600 veh/hr.
- Junctions of two-lane roads.
- Junctions without nearby commercial entrances.
- Low truck and bus volumes.
- Expected lower construction costs since footprint is within existing travelway boundaries.



Perspective view of a reverse curve splitter island

FHWA Research Contract

The Federal Highway Administration (FHWA) has sponsored a research project, entitled "Field Testing, Marketing, and Crash Analyses for Mini-Roundabouts," Contract No. DTFH61-09-C-00027. The objectives of the contract include before vs. after evaluation of 10 mini-roundabouts to be implemented in the United States. FHWA is looking for Agencies who are willing to fund and construct mini-roundabouts soon. The traffic operational and safety effects of the mini-roundabouts will then be evaluated by the research team for FHWA.



Perspective view of flush approach splitter islands and flush central island with post-mounted delineators

If you wish to participate or need more information please contact:

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 202-493-3317
 202-493-3419 fax
 wei.zhang@dot.gov

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 202-493-3314
 202-493-3419 fax
 joe.bared@dot.gov

Federal Highway Administration
 6300 Georgetown Pike
 McLean, VA 22101

Ram Jagannathan - VHB, Inc.
 703-847-3071
 703-847-0298 fax
 ram@vhb.com

Mini-Roundabouts



Properly designed modern roundabouts have been demonstrated worldwide to be effective in reducing intersection crashes. One version of roundabouts that has not yet been implemented widely in the U.S. is the mini-roundabout.

The mini-roundabout features a much smaller inscribed diameter, on the order of 50 to 80 ft, and a relatively small circular central island (e.g., 16 ft to 45 ft diameter) that is traversable. One of the promising aspects of a mini-roundabout is its small footprint and relatively low implementation cost, which allows it to be a viable treatment for urban and suburban intersections of lower speed, two-lane roads. In most cases, mini-roundabouts can fit within existing travelway boundaries. All channelizations will be added within existing boundaries.

The mini-roundabout should be primarily designed for passenger cars that are expected to use the circular roadway around the central island, which can be raised or flush. Buses and trucks may traverse over the central island to complete turning maneuvers due to restricted intersection geometry. For flush central islands, additional physical deterrent boundaries, such as raised pavement markers or rumble strips, are needed to enhance conspicuity and encourage drivers of passenger cars to stay within the circular travelway of the mini-roundabout. It is also desirable to narrow lanes to 10 ft on the approach to a mini-roundabout to ensure a reduction in speed.



U.S. Department of Transportation
Federal Highway Administration

Sample Tri-Fold Section of a Mini-Roundabout Public Brochure

Back-In Parking

Back-in/head-out angle parking is similar to both parallel and standard angle parking. With parallel parking, the driver enters the stall by stopping and backing into the space, halting traffic in the lane. The same is the case with back in parking except the driver does not need to maneuver the front of the vehicle against the curb. The primary benefit occurs when leaving the stall, the drivers have a better view of oncoming traffic when they are ready to pull forward out of the stall.

Back-in parking also provides a safer environment for bicyclists using the roadways. The driver is able to see the cyclist easily when exiting the stall. See photos to the right. Several cities where back in angle parking has been implemented have seen a reduction in the number of accidents. Back-in parking is proposed in the illustration below on Lincoln, Bird and Robinson Streets.

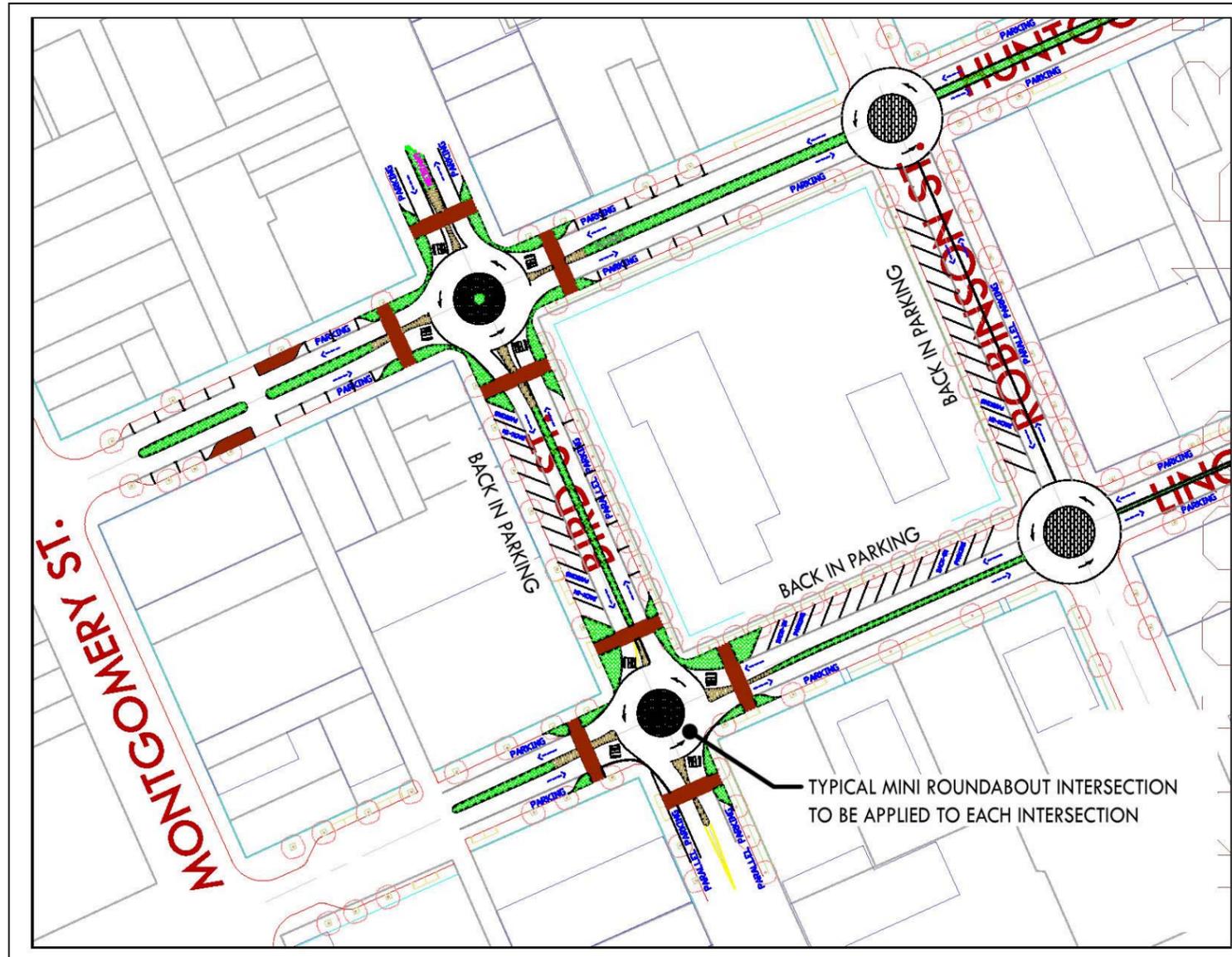


Figure 17 – Back In Parking



Note ease of driver to see oncoming bicycle traffic.

LARGE ROUNDABOUT CONCEPT

The recommendation for a large roundabout is suggested here to safely control the traffic flow from north bound Lincoln and to split it into two two-way streets at Lincoln and Huntoon while connecting to the other four streets at the intersection. This modern roundabout approach has been successful for controlling flow and access and it will minimize intersection crashes and reduce the speed of traffic. In this case at Lincoln and Huntoon Streets the roundabout also provides a location for a grand entry, welcoming visitors and locals into the “Historical Downtown Oroville” with lush landscapes and an artistic monument representing the City and its culture.

The addition of this roundabout will successfully split the one-way traffic into two way traffic providing:

- Increased traffic circulation and organization
- Increased pedestrian safety providing an enhanced experience
- Increased green space providing a cleaner and more aesthetic environment
- Increased economic value will be created when these improvements occur do to the items above; we will see increased attraction to down town, creating increased pedestrian activity and thusly more people in front of businesses and enhancing the retail / commercial market.

Right-of-Way (ROW) constraints play a larger role with the design of this roundabout where there are six different entry and exit streets. Parcels 1, 3 and 4 are the only parcels that have private ROW affected by this design. The layout of the elliptical shaped roundabout is created to provide the best entry and exits from the six streets while creating the proper speed and approaches.

Parcel 1 has the north end of the parcel (24' x 32') that is needed for the connection to W. Lincoln Street. The use of the property does not adversely affect the use of the parcel.

Parcel 2 currently uses City ROW for parking and this access will be partially eliminated.

Parcel 3 is the least affected as there is only a sliver of property (0-6' wide by 64' long) that is taken on the eastern side of the roundabout to provide space for a sidewalk. The drive access will need to be reduced to allow for a crosswalk. The proposed use of the property does not adversely affect the use of the parcel.

Parcel 4 has the greatest use of private property. The majority of this triangular shaped lot (64' x 104') is needed to blend the north end of the roundabout and connect Huntoon to Lincoln. This adversely affects the use of the parcel and with this design we recommend an acquisition. This acquisition would provide for the roundabout along with providing a great green space at the entrance to down town aesthetically enhancing the project. It is possible to adjust the roundabout and sidewalks slightly to reduce the amount of property needed. A portion of the lot would still need to be acquired.

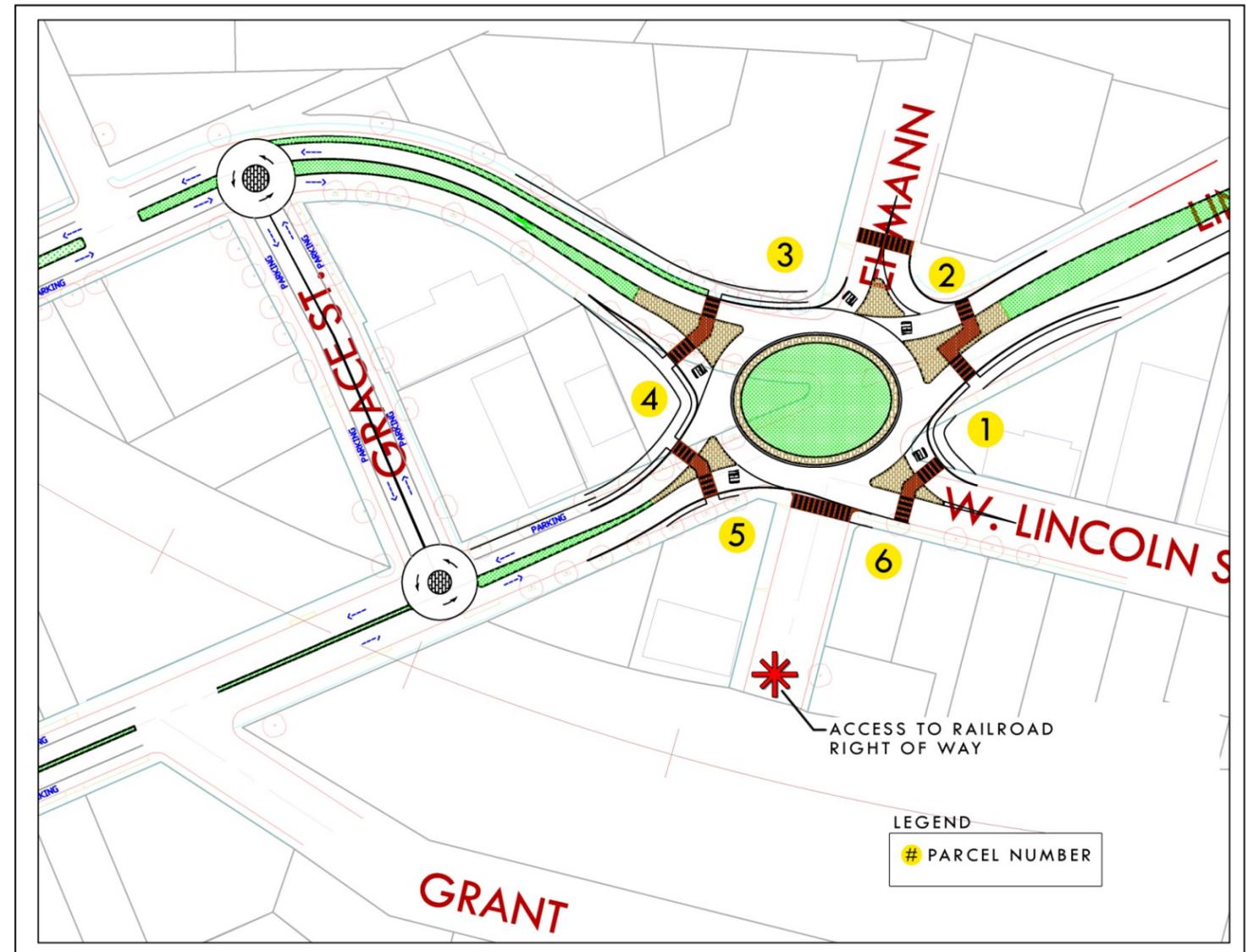


Figure 18 – Large Roundabout Concept

SINGLE LANE ROUNDABOUT AT LINCOLN AND EHMANN STREETS

- Single Lane Roundabout:
 - a. Single 12' lane - traffic friction slows traffic, safer streets, ease of viewing, ease of crossing
 - b. Center median of circle with large landscape openings as needed for ally and drive access
 - i. Historic gateway at this location
 - ii. Enhanced aesthetics, low maintenance landscape, trees for shade, art in landscape
 - iii. Way finding signage to direct visitors and locals to down town
 - iv. Design center circle
 - c. Clear line of site through to all legs of circle
 - d. Protected pedestrian crossing – safety, comfort, decorative paving
 - e. Utilize maintenance free, 360 degree visibility curb reflectors. (Shown below).
- Pedestrian areas:
 - a. Connectivity across busy streets
 - b. Z-type pedestrian crossing to promote pedestrian visibility of traffic. (Shown to the right).
- Aesthetics:
 - a. Decorative paving at intersections, bulb-outs, midblock accents, site furniture, lighting, gateway, landscape and artistic monuments
 - b. Enhance and announce the entry into downtown experience with a great monument, attractive landscape and downtown themed lighting



Z-Type Pedestrian Crossing



360 Degree Curb Reflectors – reflects light back to an approaching vehicle regardless of its oncoming direction



Curb Reflector

Streetscape Concepts

To meet the goals of the project and the General Plan, the following section outlines amenities proposed for the Lincoln and Huntoon Street improvements. The Option with Mini-Roundabout is used as an example in this case. Similar streetscape concepts will be proposed for the Stop Control Option. It is our experience that in order to create a great place, there needs to be a great emphasis in the design of the streetscape. The livability of these villages or neighborhoods is determined by what the streets are like.

The streets and sidewalks provide access to businesses, restaurants, apartments and give the pedestrian, bicyclist and driver their experience as they arrive or pass through downtown Oroville.

The reduced speed of traffic together with the quantity of vehicles contributes to the village feeling, sense of community and perceptions of safety and comfort.

With the needs of shopping pedestrians added to the mix we begin to include cafe sitting areas, decorative paving, bike parking, lighting, benches, trash receptacles, art and monuments. These elements all contribute to the environment of a living street. The proposed improvements will attract people to the downtown area and enhance the experience of shopping, dining and social outings. Although some of the items listed above may feel insignificant, they play a large role in the success of a thriving and vibrant downtown.

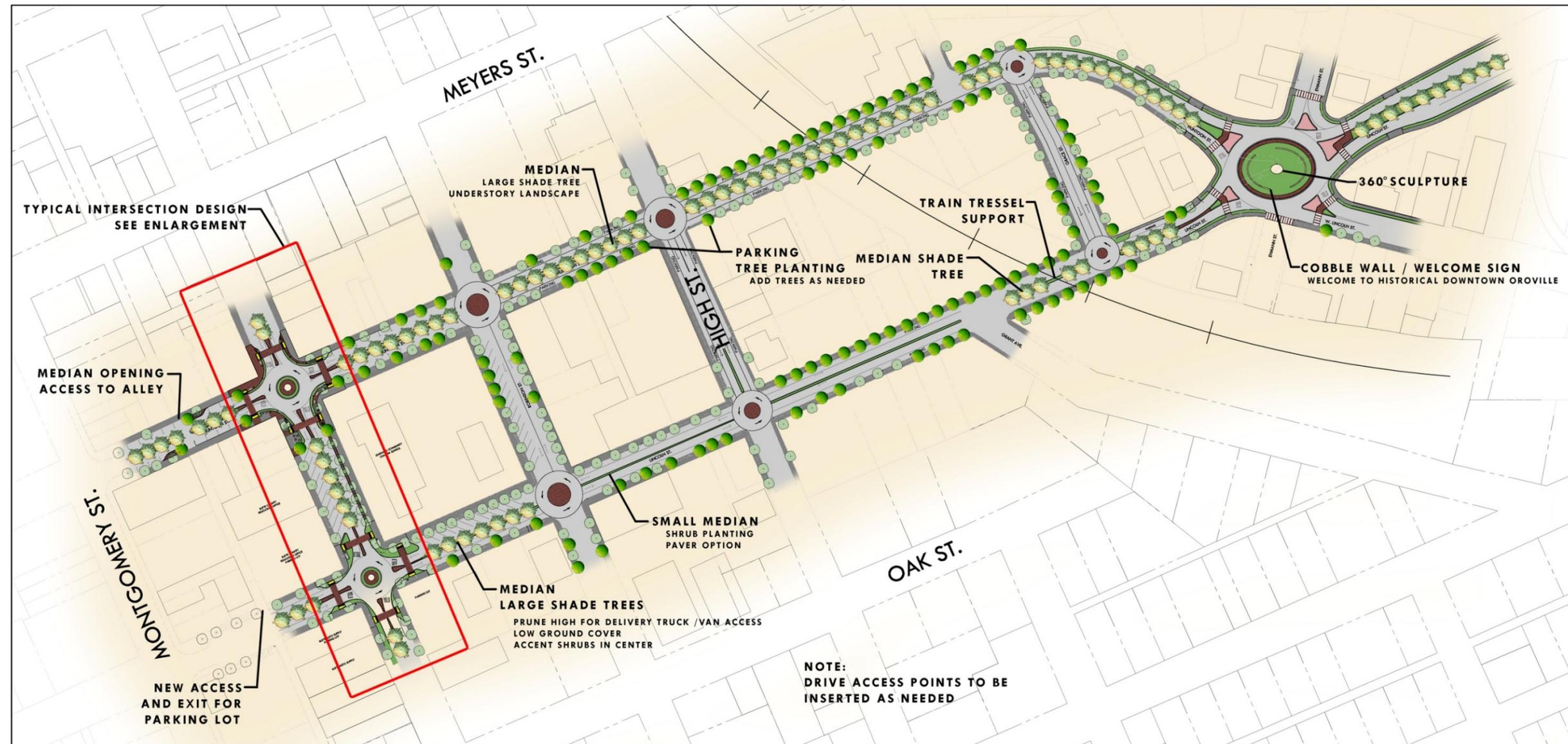


Figure 19 – Streetscape Improvements Concept Plan

Mini-Roundabout Streetscape

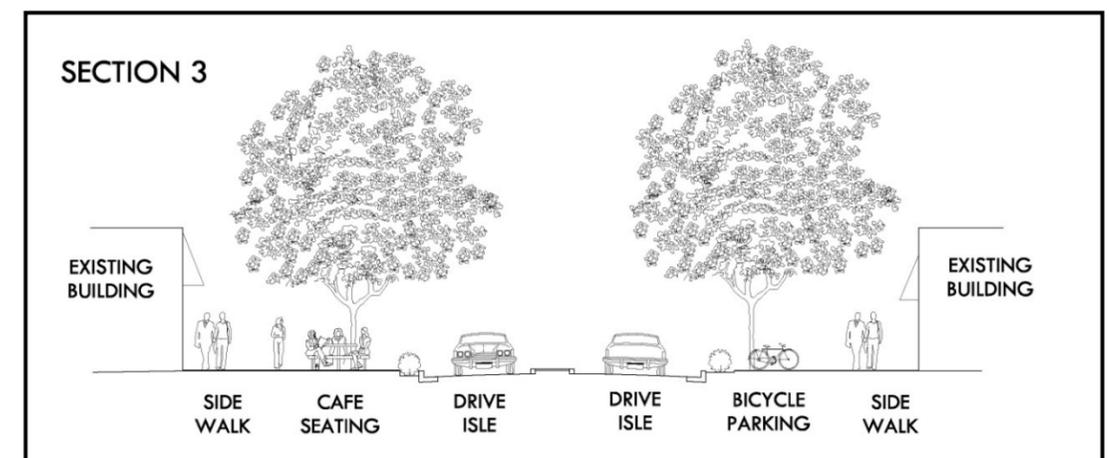
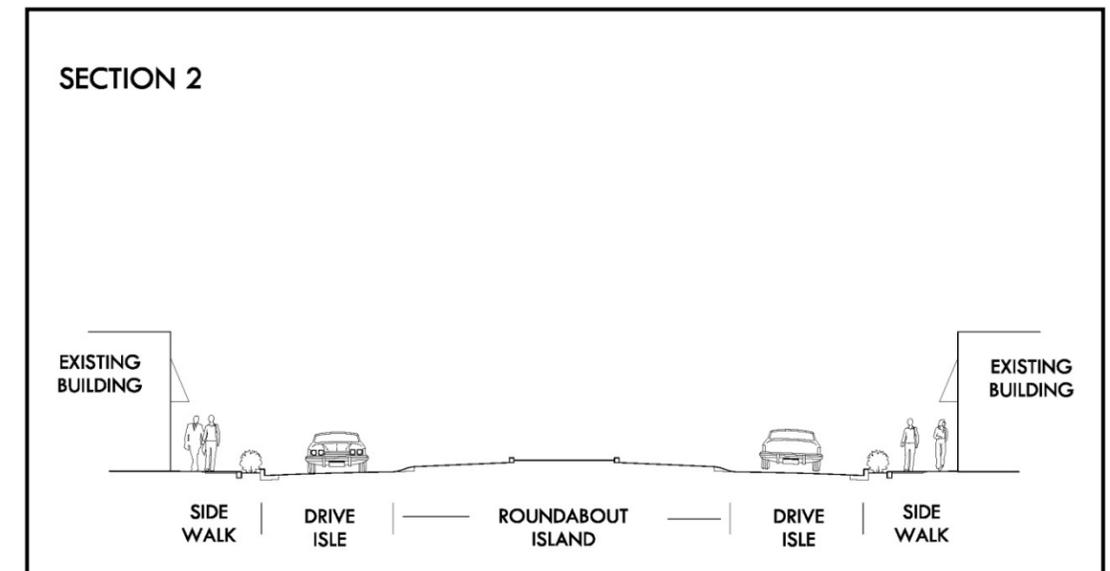
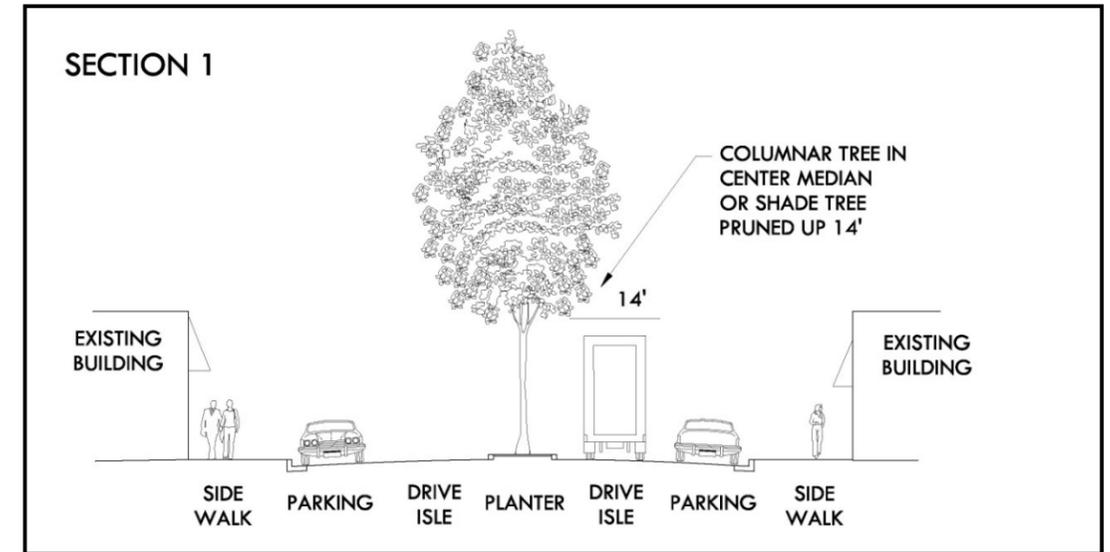
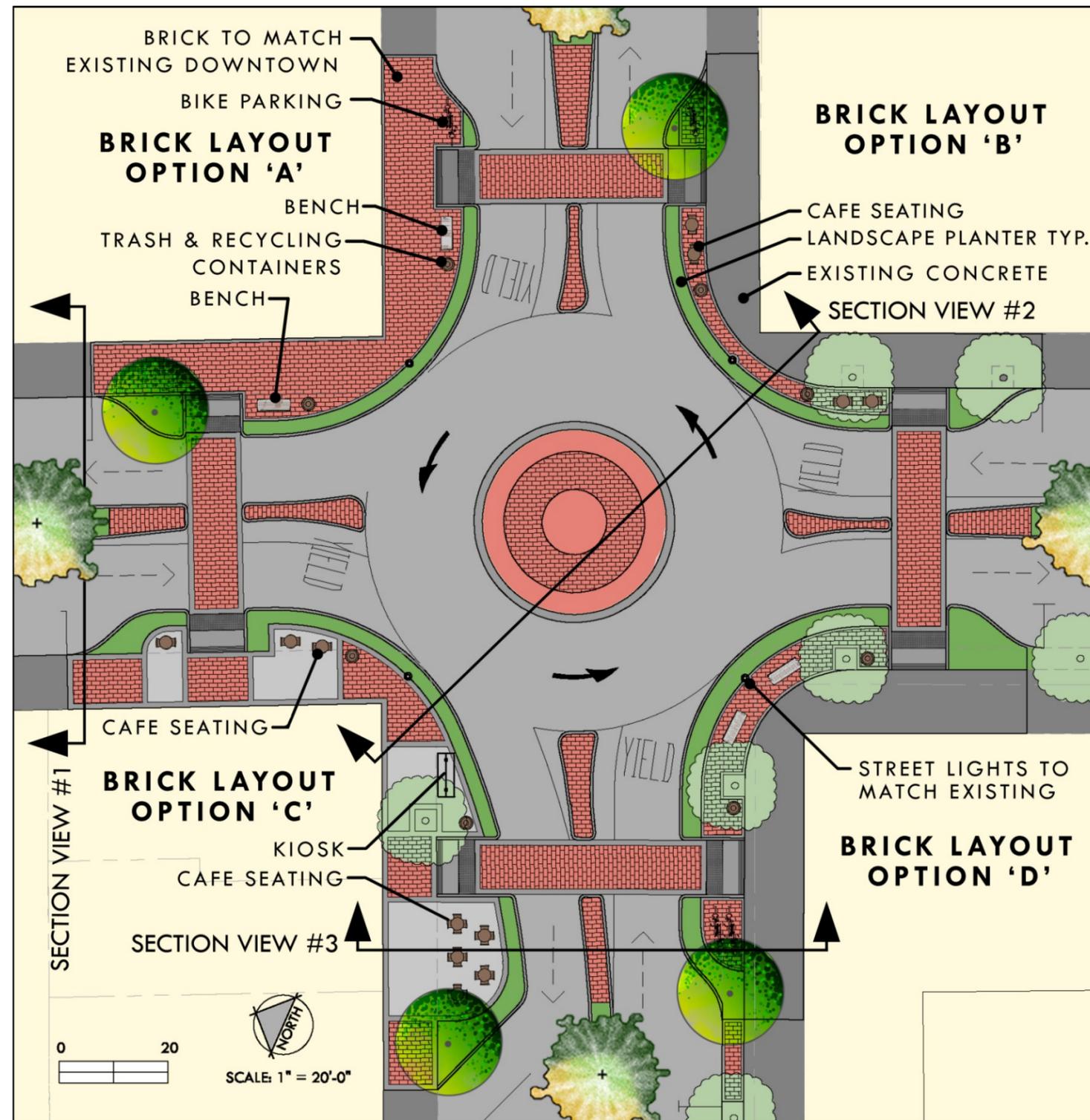


Figure 20 – Mini Roundabout - Streetscape Concept Plan

Mid Block Streetscape and Outdoor Café Seating

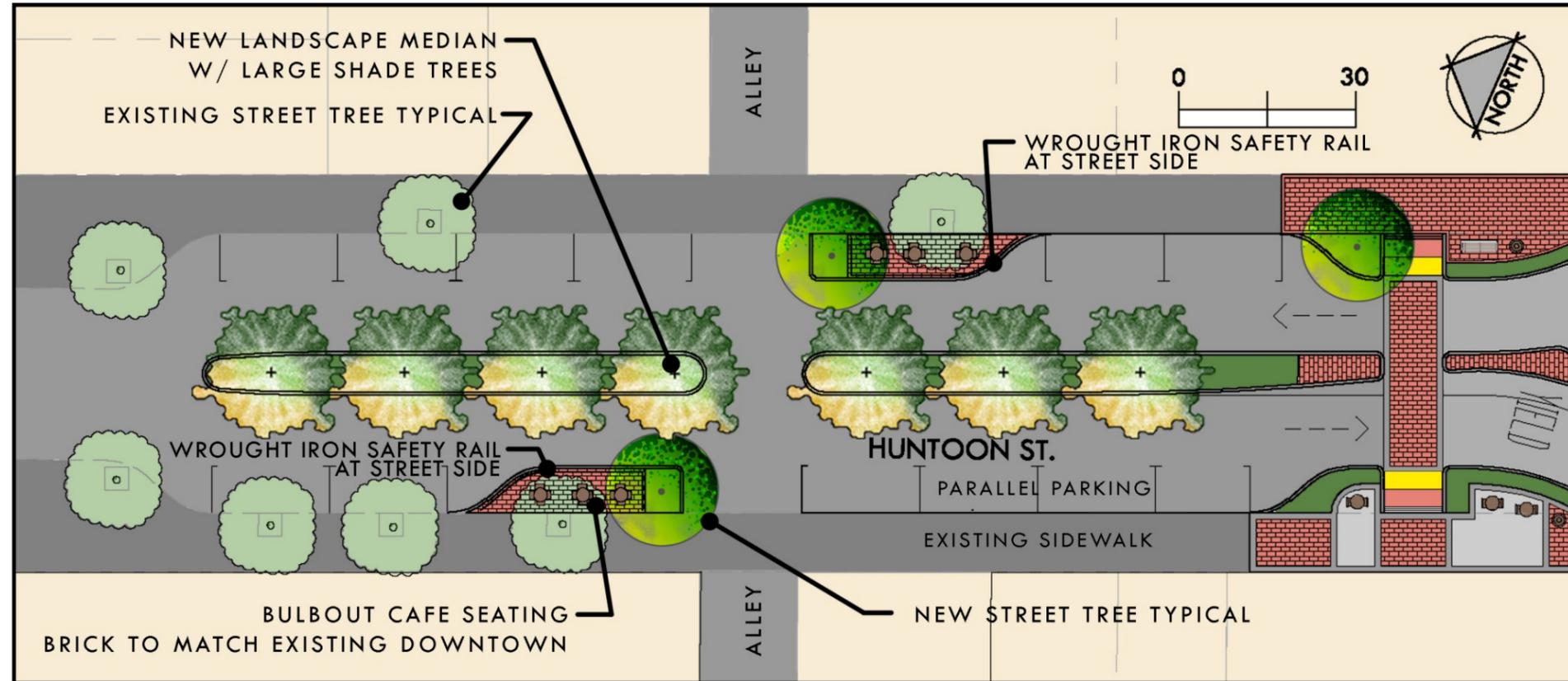


Figure 21 – Mid Block Streetscape Concept



Large Roundabout Streetscape



Figure 22 – Large Roundabout Streetscape Concept Plan

Large Roundabout Streetscape

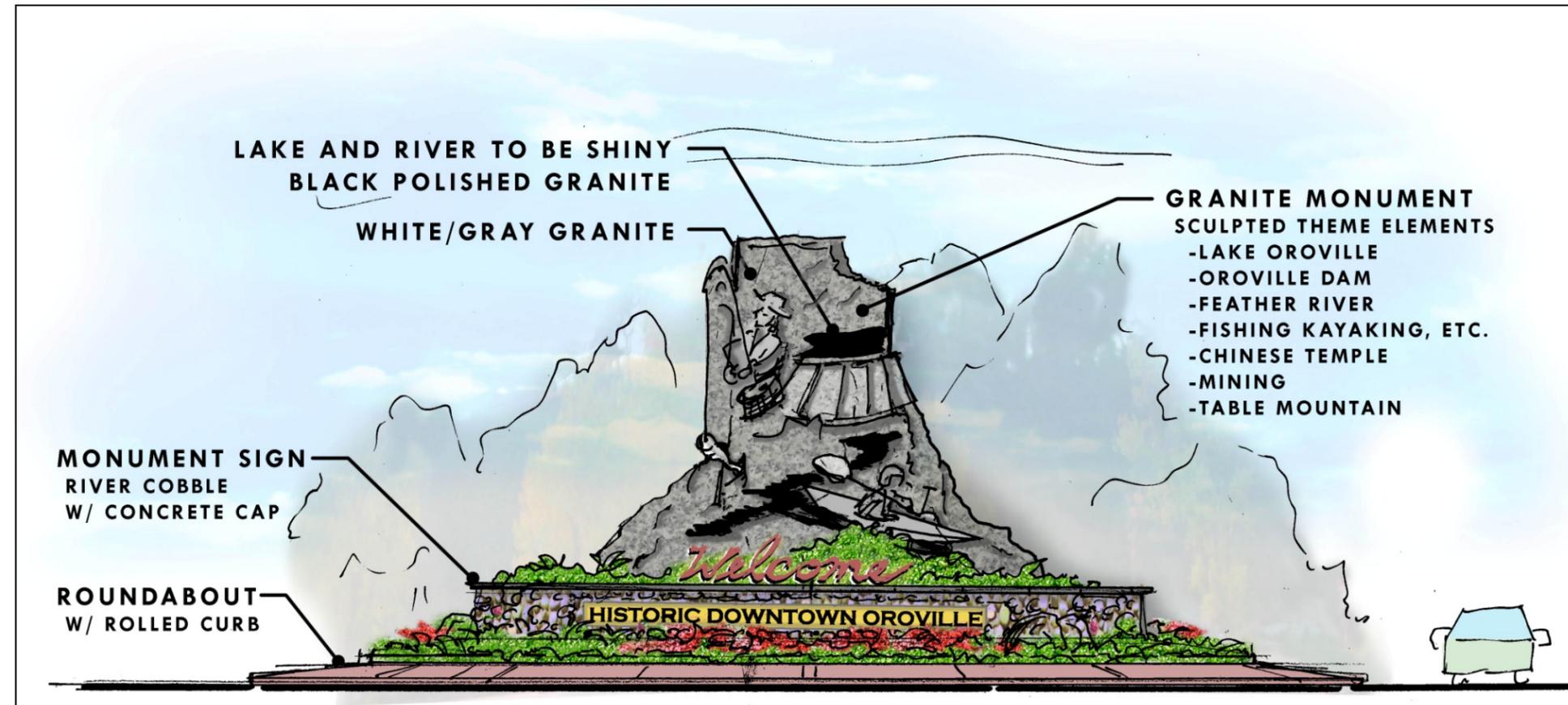


Figure 23 – Entry Monument Elevation

Monument Sculpture

- Sculpture to welcome people to Historic Downtown Oroville
- This monument should represent the City of Oroville with a form of art.
- Theme to be carried throughout the City blending with existing and future traffic related monuments

Streetscape Design Elements



Street Furnishings & Amenities

The following specifications represent a sample of elements that could be utilized as a City of Oroville standard for downtown restoration projects. A standard specification will help provide an identity to the City and a cohesive feel to public spaces. Public art can also help express a positive sense of identity and provide beautiful environments that invite interaction.



MLB310M BENCH



BENCHES

MATERIALS

The MLB310M Bench ends are made from solid cast aluminum. The seat employs flat bar straps and H.S. steel tube.

DIMENSIONS

Height: 30.75" (78.1 cm)
 Length: 70.00" (177.8cm)
 Depth: 25.00" (63.5cm)
 Seat: 17.00" (43.2cm)

FINISHES

All steel components are protected with E-Coat Rust Proofing. The Maglin Powdercoat System provides a durable finish on all metal surfaces.

INSTALLATION

Park Benches are delivered pre-assembled. Holes (0.5") are provided in each foot for securing to base.

RECYCLING/TRASH STATIONS

MATERIALS

The MRC202 Recycling Unit frame is constructed using heavy duty steel flat bar. 20 imperial gallon commercial grade plastic liners and black molded ABS plastic lid is provided. A variety of labeling options are available.

DIMENSIONS

Height: 37.75" (96.0cm)
 Width: 26.17" (66.5cm)
 Depth: 42.87" (109.0cm)

FINISHES

All steel components are protected with E-Coat Rust Proofing. The Maglin Powdercoat System provides a durable finish on all metal surfaces.

INSTALLATION

Trash/Recycling Stations are delivered pre-assembled. Holes (0.5") are provided in each mounting foot for securing to base.



MRC202 RECYCLE UNIT



MLP200 PLANTER



PLANTERS

MATERIALS

The MLP200 Planters frame is constructed using heavy duty steel flat bar. A plastic liner is provided.

DIMENSIONS

Height: 24.00" (60.9cm)
 Diameter: 25.00" (63.5cm)

FINISHES

All steel components are protected with E-Coat Rust Proofing. The Maglin Powdercoat System provides a durable finish on all metal surfaces.

INSTALLATION

Planters are delivered pre-assembled. Holes (0.5") are provided in each mounting foot for securing to base.



MBR600 SERIES BIKE RACK



BIKE RACKS

MATERIALS

All parts of the MBR600 Series Bike Rack are made from H.S. steel tube and solid steel rod.

DIMENSIONS

Height: 34.70" (88.0cm)
 Tube Diameter: 4.50" (11.5cm)

FINISHES

All steel components are protected with E-Coat Rust Proofing. The Maglin Powdercoat System provides a durable finish on all metal surfaces.

INSTALLATION

Bicycle Racks are delivered pre-assembled. Holes (0.5") are provided for securing to base.

KIOSKS

MATERIALS

The MLK103 - 3 sided Kiosk is constructed using laser cut and H.S. steel frame. Three lockable indoor/outdoor signage display holders with 23" x 35" viewable areas are provided.

DIMENSIONS

Height: 83.87" (213.0cm)
 Width: 39.00" (99.0cm)

FINISHES

All steel components are protected with E-Coat Rust Proofing. The Maglin Powdercoat System provides a durable finish on all metal surfaces.

INSTALLATION

Kiosks are delivered pre-assembled. Holes (0.5") are provided in each foot for securing to base.



MLK103 KIOSK



WAYFINDING SIGNS & BANNERS

Existing wayfinding signs utilized by the City for places of interest such as the Greenline Tour, public parking and accessible paths of travel may be expanded to include new and historic features of the restored areas of the downtown area.

A standard format should be established to unify the different types of signs that could then be utilized throughout the City.

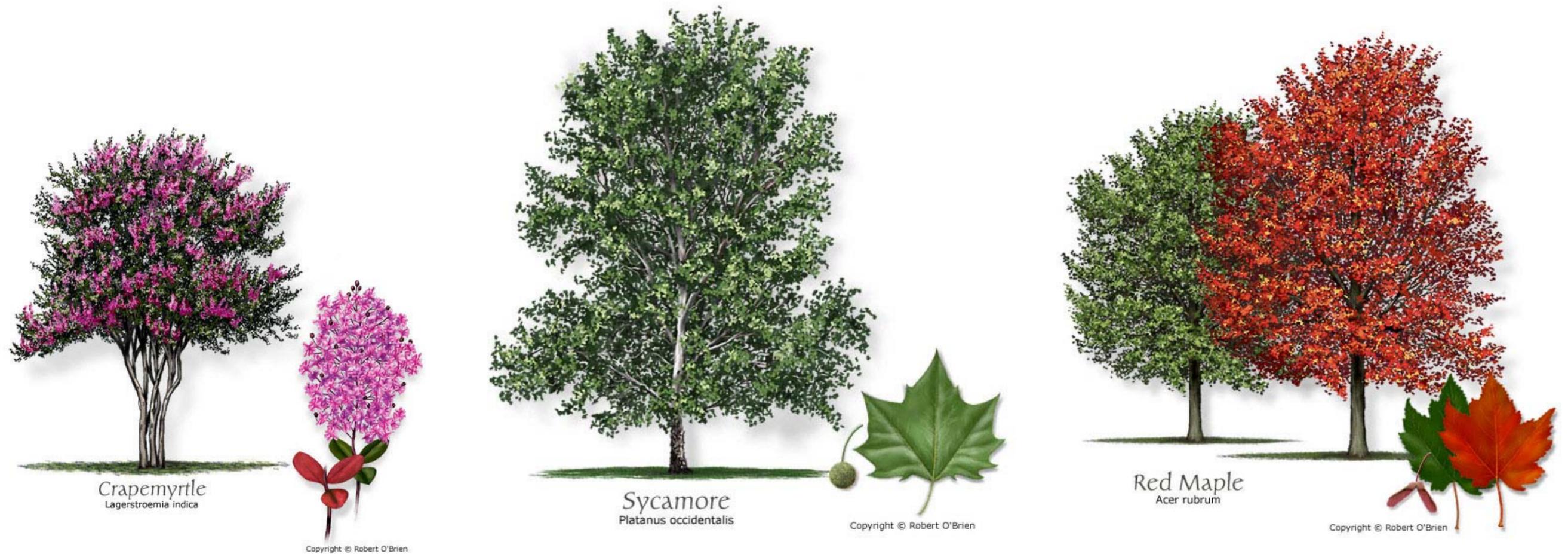
Street light banners could also be utilized to display holiday greetings, historic reverence and notice of upcoming special events.

Landscaping

As described in the previous Street Furnishing and Amenities section; a standard specification for street trees and plant material will also help provide an identity to the City and a cohesive feel to public spaces.

The following tree species represent a profile that would work well with the restoration of Lincoln and Huntoon Streets, including the flowering Crape Myrtle that is currently used as an accent tree throughout the City, the native Sycamore tree and large shade trees with fall color such as the Red Maple, Ginkgo tree and the Chinese Pistache.

Street Trees





COMPARATIVE SUMMARY

As a comparison between the two options for Lincoln and Huntoon the pros and cons are discussed in more detail in the section descriptions of each option. The purpose of this report is to demonstrate these options and provide alternatives based on what is best for the City and Community.

The two options for intersections along Lincoln and Huntoon will provide a controlled intersection, angled parking and landscape medians. This concept provides the community with the appropriate traffic flow, slowing of vehicles for safety and viewing of businesses.

The angled parking will maintain or slight increase in the total number of parking spaces downtown while taking up asphalt and concrete for landscape.

The medians and bulb-outs will create an aesthetically pleasing environment, safe pedestrian crossings and encourage social outings through café seating areas for local business. Complimentary streetscape amenities such as benches, trash bins, landscape containers and uniform street lighting will also help to unify the character and history of downtown Oroville.

Mid-block pedestrian areas can be provided throughout the downtown area. These areas are able to replace any parking space and be located for retail or commercial businesses as needed for additional outdoor seating.

The Stop Control Option can also include bulb-out intersections and many of the same site amenities but a significant number of "breaks" in the median would be required (no median in many locations) for access in and out of driveways along all streets since no u-turn capabilities are available at the intersections. This degrades the overall feel of the project area significantly if the goal is to make a better sense of "place" in downtown to promote business activity and people presence.

Stop Control seems a better option for both safety and businesses, but will frustrate through traffic with stop-go-stop-go for the entire length of the corridors, thus potentially creating through traffic to avoid the downtown area all together which is of course not good for business promotion.

Although the Stop Control Option may seem prudent along Lincoln and Huntoon for improved main street capacity for through traffic and local drivers, safety suffers significantly and side street traffic would be severe (impacting side street businesses and increasing driver frustration of accessing side streets). The overall feel of the project area will be dictated by the traffic on the two main corridors, thus playing down businesses on side streets and lack of through traffic wanting to slow, stop, or turn and explore any new businesses or the project area.

Phasing Strategies

Unfortunately, this project is difficult to build in phases due to the existing one way traffic and the need for the large roundabout at the intersection of Lincoln and Huntoon Streets to be in place prior to changing the direction of traffic.

The direction of traffic cannot be changed at Lincoln or Huntoon Streets, northbound, without having the Ehmann / Lincoln / Huntoon roundabout put in to direct the traffic and in reverse, we cannot install the directional changes of traffic south bound on Lincoln or Huntoon without having the roundabout to redistribute at the south end of the project.

Bulb-out intersection areas could be installed as a phase one, especially if the Stop Control option is utilized. Bulb-out intersections could also be installed as a first phase of the Preferred Mini-Roundabout option, but the center roundabout elements would need to be installed in a future phase after the traffic is changed to two-way.

The installation of landscape medians could be installed in future phases, along with the raised centers of mini-roundabouts (if selected) and certain planting areas but these items are needed both for aesthetic value and the control of traffic.

In order to alleviate these conflicts, the City may want to consider the need for complete project build out in lieu of alternate phasing options.