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<tr>
<td>ADA</td>
<td>Americans with Disabilities Act</td>
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<td>APE</td>
<td>Area of Potential Effect</td>
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<td>BID</td>
<td>Downtown Denver Business Improvement District</td>
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<td>CCD</td>
<td>City and County of Denver</td>
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<td>CFR</td>
<td>Code of Federal Regulations</td>
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<td>CPTED</td>
<td>Crime Prevention Through Environmental Design</td>
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<td>D&amp;F</td>
<td>Daniels and Fisher</td>
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<td>DDP</td>
<td>Downtown Denver Partnership</td>
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<td>DUS</td>
<td>Denver Union Station</td>
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<td>EA</td>
<td>Environmental Assessment</td>
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<td>FHWA</td>
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<td>LPA</td>
<td>Locally Preferred Alternative</td>
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<td>Mall</td>
<td>16th Street Mall</td>
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<td>NACTO</td>
<td>National Association of City Transportation Officials</td>
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<td>NRHP</td>
<td>National Register of Historic Places</td>
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<td>RTD</td>
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<td>State Historic Preservation Office</td>
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1 Introduction

Denver’s 16th Street Mall (Mall) is a busy transit and pedestrian transportation facility and premier public space located in downtown Denver, Colorado. The original 12.5 blocks of the Mall, from Market Street to Broadway, are now more than 35 years old and in need of repair and revitalization as a result of both the passage of time and construction methods that caused failure and deterioration of the materials. The Mall’s design has also not kept pace with current safety, mobility, and public needs. A group of partners comprising the Regional Transportation District (RTD), City and County of Denver (CCD), Denver Downtown Partnership (DDP), and Federal Transit Administration (FTA) (Project Partners) propose to implement improvements to the Mall to address long-term infrastructure, mobility, safety, and public use needs referred to as the Project.

This draft Section 4(f) Evaluation was prepared in compliance with FTA’s responsibilities under the provisions of Section 4(f) of the Department of Transportation Act of 1966, as amended [Section 4(f)], associated regulations codified in 23 Code of Federal Regulations (CFR) § 774, and FTA guidance outlined in Section 4(f) Policy Paper (FHWA, 2012). It is supported by other analysis in the 16th Street Mall Alternatives Analysis and Environmental Assessment (EA) (FTA, 2019) and supporting documents, including the Cultural Resources Technical Report (Appendix A), Alternatives Analysis Technical Report (Appendix B), and 16th Street Mall: Small Steps Towards Big Change Study (Gehl, 2016).

1.1 Section 4(f) Applicability

Section 4(f) prohibits the use of land from significant publicly owned parks, recreation areas, wildlife and waterfowl refuges, and significant historic sites, whether publicly or privately owned (referred to as Section 4(f) Properties), for transportation projects unless one of the following occurs:

- FTA determines that use of the property, including any measure(s) to minimize harm committed by the applicant, will have a de minimis impact (as defined in 23 CFR § 774.17) on the property; or

- FTA determines that
  - There is no feasible and prudent avoidance alternative, as defined in 23 CFR § 774.17, to the use of land from the property; and
  - The action includes all possible planning, as defined in 23 CFR § 774.17, to minimize harm to the property resulting from such use.

Section 4(f) applies when a U.S. Department of Transportation agency approves a transportation project that uses Section 4(f) property. Subject to certain exceptions, use of a Section 4(f) property occurs when:

- Land from a Section 4(f) property is permanently incorporated into a transportation project, which occurs when land from a Section 4(f) property is either purchased outright for transportation right-of-way or needed for a permanent easement for maintenance or other transportation-related purpose.
The project requires a temporary occupancy of land that is adverse in terms of the Section 4(f) statute’s preservation purposes. Temporary occupancies that are not adverse, as defined in 23 CFR § 774.13, are not considered Section 4(f) uses.

There is a constructive use of the property where land from a Section 4(f) property is not incorporated into the transportation project, but the project’s proximity impacts are so severe that the protected activities, features, or attributes that qualify a property for protection under Section 4(f) are substantially impaired and the value of the resource, in terms of its Section 4(f) purpose and significance, is substantially diminished.

Section 4(f) regulations include various exceptions to the requirement for Section 4(f) approval, outlined in 23 CFR § 774.13. If FTA determines that a project may result in the use of Section 4(f) property, and none of the exceptions apply, approval can be achieved through the preparation of (1) a de minimis impact determination or (2) an Individual Section 4(f) Evaluation. Certain minor uses of Section 4(f) properties can also be prepared as Programmatic Section 4(f) evaluations if projects meet specific criteria in one of the approved programmatic evaluation categories. The Project does not meet the criteria for a Programmatic Section 4(f) evaluation so details of the criteria and applicability of programmatic evaluations are not discussed in this document.

### 1.2 De Minimis Impact Criteria

Certain uses of Section 4(f) land may have a minimal or de minimis impact on the protected resource. When this is the case, FTA can make a de minimis impact determination. Use of properties with de minimis impacts do not require an analysis of avoidance alternatives or a least harm analysis [23 CFR § 774.17(4)].

The de minimis criteria and associated determinations for parks, recreation areas, and wildlife and waterfowl refuges are different than for historic properties:

- A de minimis impact to a public parkland, recreational area, or wildlife and waterfowl refuge is defined as that which does not “adversely affect the features, attributes or activities qualifying the property for protection under Section 4(f)” (FHWA, 2012). This determination can be made only after the concurrence of the official with jurisdiction and opportunity for public review and comment on the proposed determination.

- For historic sites, de minimis impact means that FTA has determined, in accordance with 36 CFR § 800.5, and the State Historic Preservation Office (SHPO) concurs, that no historic properties are affected by the project or that the project will have No Adverse Effect on historic properties.

If FTA cannot determine that the use of a Section 4(f) property will result in a de minimis impact, an individual Section 4(f) evaluation is required following the steps outlined in Section 1.3.
1.3 Requirements for Individual Section 4(f) Evaluations

The Individual Section 4(f) Evaluation includes an assessment of alternatives, as described in Section 1.3.1, that would avoid use of Section 4(f) properties (avoidance alternatives). If a feasible and prudent avoidance alternative is available, FTA must select this alternative. If avoidance alternatives do not exist, FTA must determine and select the alternative that causes the least overall harm to Section 4(f) properties (least harm analysis), balancing seven factors described in Section 1.3.2. The least harm analysis incorporates reasonable mitigation measures for all alternatives under consideration. After identifying the alternative that causes the least overall harm to Section 4(f) properties, FTA must develop and include all possible planning in the project to minimize harm to Section 4(f) properties (measures to minimize harm), as described in Section 1.3.3.

Throughout the Section 4(f) evaluation process, FTA and Project Partners are required to consult with the officials with jurisdiction over each of the protected properties potentially affected by the proposed project. For parks and recreation areas, the official with jurisdiction is the public agency that owns or manages the resource. For historic properties, the official with jurisdiction is the SHPO.

1.3.1 Avoidance Alternatives Analysis

An alternative that would not require the use of any Section 4(f) property and is feasible and prudent to meet project needs is known as an avoidance alternative. Per the regulations, a feasible and prudent avoidance alternative is one that “avoids using Section 4(f) property and does not cause other severe problems of a magnitude that substantially outweighs the importance of protecting the Section 4(f) property” (23 CFR § 774.17). To determine whether there are other severe problems of a magnitude that substantially outweigh the importance of protecting the Section 4(f) property, both the feasibility and prudence of each potential avoidance alternative is considered. As defined in 23 CFR § 774.17:

- An alternative is not feasible if it cannot be built as a matter of sound engineering judgment.
- An alternative is not prudent if:
  i. It compromises the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need;
  ii. It results in unacceptable safety or operational problems;
  iii. After reasonable mitigation, it still causes:
    a) severe social, economic, or environmental impacts,
    b) severe disruption to established communities,
    c) severe disproportionate impacts to minority or low-income populations,
    d) severe impacts to environmental resources protected under other federal statutes;
  iv. It results in additional construction, maintenance, or operational costs of an extraordinary magnitude;
It causes other unique problems or unusual factors; or

vi. It involves multiple factors in paragraphs (3)(i) through (3)(v) of this definition, that while individually minor, cumulatively cause unique problems or impacts of extraordinary magnitude.

The feasible and prudent avoidance alternatives analysis requires the identification of a reasonable range of project alternatives, including those that avoid using Section 4(f) property. After potential avoidance alternatives have been identified, the next step is to determine, for each potential avoidance alternative, whether avoiding Section 4(f) properties is feasible and prudent according to the discussed criteria. An important consideration in identifying potential avoidance alternatives is that they should have a reasonable expectation of serving the transportation needs identified in the Project purpose and need. Determining an alternative's feasibility and prudence must also consider impacts to Section 4(f) properties and impacts to non-Section 4(f) properties and be compared to the impacts associated with other alternatives.

If a feasible and prudent avoidance alternative exists, FTA must select this alternative. If the avoidance alternatives analysis concludes that there is no feasible and prudent avoidance alternative, FTA may approve, from among the remaining alternatives, only the alternative that causes the least overall harm in light of the preservation purpose of the statute.

1.3.2 Least Harm Analysis

If multiple alternatives under consideration result in use of Section 4(f) property and no feasible and prudent avoidance alternatives exists, FTA must compare the remaining alternatives under consideration according to the seven following factors [23 C.F.R. § 774.3(c)(1)]:

i. The ability to mitigate adverse impacts to each Section 4(f) property

ii. The relative severity of the remaining harm after mitigation

iii. The relative significance of each Section 4(f) property

iv. The views of the officials with jurisdiction over each property

v. The degree to which each alternative meets the project purpose and need

vi. The magnitude of adverse effects to resources not protected by Section 4(f)

vii. Substantial cost differences among the alternatives

FTA must select the alternative that will cause the least overall harm (after factoring in mitigation measures) according to these factors.

1.3.3 All Possible Planning to Minimize Harm

Before approving an action requiring use of any Section 4(f) property, FTA is required to “include all possible planning to minimize harm” in that action. All possible planning, defined in 23 CFR § 774.17, means that all reasonable measures identified in the Section 4(f) evaluation to minimize harm or to mitigate for adverse impacts and effects are included in the project. Minimization of harm may entail both design modifications to reduce the amount of Section 4(f) property that is used and mitigation measures that compensate for residual impacts. For historic sites, mitigation measures are generally identified through the Section 106 consultation process in accordance with 36 CFR § 800.
2 Project Background

Denver’s 16th Street Mall is a transit and pedestrian transportation facility located in downtown Denver, Colorado. Construction of the original Mall was completed in 1982 to connect a free shuttle bus transit service, known as the Free MallRide, along 16th Street between the RTD bus hubs of Market Street Station at Market Street and Civic Center Station at Broadway.

After opening the renovated and revitalized Denver Union Station (DUS) transit hub in 2014, the Market Street Station was closed, the Free MallRide service area was extended to DUS, and the Mall was extended west along 16th Street from Market Street to Wewatta Street.

The Mall is Denver’s busiest transit artery and premier public space, and one of the longest pedestrian and transit malls in the world. It is designated as a fixed guideway, and the Mall energizes the downtown business environment with a unique pedestrian- and transit-oriented public space. Today, the Free MallRide serves 39,000 daily riders and eliminates approximately 870 daily bus trips from downtown Denver streets, reducing traffic congestion.

The original 12.5 blocks of the Mall, from Market Street to Broadway, are now more than 35 years old and in need of repair and revitalization due to both the passage of time and construction methods that caused failure and deterioration of the materials. The Mall’s design has also not kept pace with current safety, mobility, and public needs.

Multiple recommendations and studies to address the Mall’s infrastructure, safety, mobility, programming, and use have been put forth over the past decade by CCD, RTD, DDP, and Downtown Denver Business Improvement District (BID). None of the prior studies has resulted in an agreed-upon comprehensive program of improvements. Absent a long-term solution, the Mall requires nearly continual maintenance; maintenance costs have risen sharply and continue to rise. The Project Partners now propose to implement improvements to the Mall to address long-term infrastructure, mobility, safety, and public use needs referred to as the Project.

2.1 Project Limits and Study Area

The Project limits cover the length of the original 12.5 blocks of the Mall from Market Street to Broadway. The Mall is an 80-foot-wide transit way and pedestrian corridor with three distinct zones, a central zone (symmetrical section) with a 22-foot-wide median with two parallel rows of trees between the transit-way lanes, and end blocks (asymmetrical sections) where the transit-way lanes are adjacent with two parallel rows of trees on only one side (referred to as the wide side) of the section. With the exception of the last half-block of the eastern end of the Mall, buildings flank the linear transportation facility. The half-block, referred to as the Gateway Plaza, is triangular-shaped, with buildings along the south side and a small plaza anchored by a fountain to the north. Figure 2-1 shows the Project limits and EA study area.
Figure 2-1. Project Limits and Study Area
The zones of the Mall illustrated on Figure 2-2 are sometimes referred to as “rooms” in the design. The existing asymmetrical sections comprise five-and-a-half blocks, including three blocks from Market Street to Arapahoe Street on the west end and two-and-a-half blocks from Tremont Place to Broadway on the east end, including the half-block Gateway Plaza. The asymmetrical sections are aligned with the transit-way lanes next to each other, a wider pedestrian zone (or triangular-shaped plaza in the case of the half-block Gateway Plaza) and two rows of trees on the north side, and a narrower pedestrian zone without trees on the south side. The symmetrical section consists of the seven blocks from Arapahoe Street to Tremont Place and includes a 22-foot center median with two rows of trees and public amenities separating the transit way and equally-sized pedestrian zones on the north and south sides of the transit-way lanes. The buildings along the Mall also reflect the distinct zones, with older (late 1800/early 1900) buildings in the central zone and more recent mid-century or newer buildings in the end zones.

Figure 2-2. Existing Mall Plan View (top) and Cross-sections for Asymmetrical (left) and Median Blocks (right)
2.2 Purpose and Need

The purpose of the Project is to develop and implement a flexible and sustainable plan for the Mall to address deteriorating infrastructure, provide equitable and sufficient space for high-quality public gathering opportunities, improve pedestrian and vehicle safety, and continue reliable two-way transit shuttle bus service on the Mall while honoring the Mall’s use and iconic design.

The following improvements are needed:

- **Address deteriorating infrastructure to allow reasonable maintenance frequency and costs to RTD and CCD.** The Mall’s pavement system does not provide drainage for water that seeps into the mortar base below the granite pavers. Water becomes trapped and loosens the mortar surrounding the granite pavers during freeze-thaw cycles, and as a result, the pavement surface breaks over time. Other elements of the Mall are also in need of rehabilitation and/or modernization. Many of the trees have died or are in poor health; fountains are not active; and power and communications technology is inadequate to support modern programming and public use. Although the original lights were replicated and replaced in 2016 and are functional, the iconic lamps do not provide enough light for pedestrian feeling of safety and visibility.

- **Improve safety for pedestrians and vehicles.** There is not adequate space nor clear visual or physical delineation between the pedestrian walkways and the transit way, other than 4-inch curbs of the same material and color as the adjacent surfaces, which were designed purposefully to blend in with the surrounding pavement pattern. Safety concerns arise as pedestrians intentionally (because of crowding resulting from the undersized pedestrian walkways) or accidentally (because of lack of clear delineation) walk in and across the transit way, causing pedestrian-vehicle conflicts and near-misses. In addition, the finish applied to the pavers has become slippery, causing pedestrian slips and falls and a loss of shuttle traction during inclement weather.

- **Improve mobility for desired transit operations and for all users.** The Free MallRide shuttle service is a critical link in Denver’s transit system. It currently serves 39,000 riders each weekday, and it is estimated it will serve 70,000 riders per day by 2035. Frequent maintenance of the failing pavement results in interruptions to transit service. The Mall also serves large pedestrian volumes, and the walkways, which are undersized for peak hour pedestrian traffic, do not meet the 10-foot CCD standard for downtown sidewalk width (CCD, 1993) and are frequently obstructed by pedestrians gathering at shuttle stops. Both transit and pedestrian demand peaks during weekday lunch hours.

- **Increase opportunities for public use of the Mall as an iconic civic space for leisure, commerce, and tourism.** The Mall was originally developed as a transit way to relieve bus congestion in downtown Denver and to revitalize 16th Street as a “place for people.” The designers considered the pedestrian areas closest to the buildings to be “quasi-private spaces – adjuncts to the shops themselves,” and they considered the center of the Mall to be public open space (Pei & Partners, 1977). In current times, quality public gathering activities have become hampered by inadequate and inflexible public spaces within the Mall. In the symmetrical median blocks especially, the transit ways separate the public realm and pedestrian space into three separate zones, each undersized for safe and
engaging public use and amenities. In the asymmetrical blocks, the inequitable division of space between the narrow and wide sides hampers effective public use of the entire Mall and has led to stagnant, underused spaces on the narrow sides. A negative perception of safety, along with isolation and lack of natural surveillance of the medians, inhibits positive public use of the Mall and the Free MallRide in some locations. Adequate and flexible public space is needed to attract more people to the Mall for quality public gathering activities.

Each of these needs is further detailed in Section 2.2.1 through Section 2.2.4.

2.2.1 Addressing Deteriorating Infrastructure

The Mall was designed and constructed to have a 30-year design life, which was reached in 2012. Inherent issues with the Mall’s infrastructure cause safety concerns, a high frequency of maintenance activities, and expense. Just 5 years after the Mall opened, concerns by RTD over the design and construction methods used to install the pavement system in the transit way led to a settlement with the project architect and the original project contractor in 1987. A Failure Analysis of the Masonry Pavement of the Sixteenth Street Mall (Knott and Stevens, n.d.) discusses the design and construction methods that ultimately led to the settlement. The architect and contractor agreed to pay RTD for replacement of the mortar that bonds the granite pavers to the concrete slab within the transit way. The payment was made in installments over 25 years and ended in 2012. RTD used the settlement funds to offset its annual maintenance costs for the transit way. Since 2012, when the settlement payments expired, RTD and CCD are responsible for funding the entire cost related to transit way maintenance.

2.2.1.1 Pavement and Drainage Systems

Granite pavers comprise the Mall’s unique pavement material. The transit way was constructed with 4-inch-thick granite pavers that were installed in a mortar setting bed over a series of concrete slabs. The Mall’s pedestrian area consists of 2-inch-thick granite pavers in a mortar setting bed, which overlays a series of concrete slabs. The transit way is depressed from the pedestrian way with a subtle 2-foot-wide horizontal band of light gray and charcoal gray granite pavers that acts as a 4-inch curb along the transit way. Figure 2-3 illustrates the design of the Mall’s pavement system.
The intricate pattern and spatial relationships of paver size, layout, grid, and colors is an important and distinguishing element of the design.

The 16th Street Mall Pedestrian Hardscape Inspection, Repair, and Maintenance Program (Atkinson, 2015) project report evaluated the condition of pavers on the Mall. In cataloging the paver condition, the following granite paver stress conditions were observed: cracked pavers, displaced pavers, loose pavers, spall, or missing/loose sealant. The following conditions were commonly observed damage patterns throughout the Mall:

- Cracked and loose pavers were typically found at block ends and alley crossings, likely caused by stress from bus and vehicular traffic.
- Mortar erosion was most common near the curbs of the transit way, likely caused by the accumulation of moisture near the back of curb.
- Pavers near transit way curbs and expansion joints were more likely to be cracked, loose, and displaced as a result of little to no lateral support.
- Loose and displaced pavers were common under and adjacent to planters and electrical enclosures because of loading stress.
- Cracked pavers were observed adjacent to utility openings, which create weak points in the pavers.

The Mall’s pavement system does not provide drainage for water that seeps into the mortar base below the pavers; when moisture infiltrates below the surface of the pavers, it is usually trapped there for an extended period of time. The concrete slab is not typically sloped to drain, and the storm sewers are designed for surface water runoff only. Therefore, when moisture from snow or rain infiltrates below the surface of the pavers, it is usually trapped there for an
extended period, as shown on Figure 2-4. The mortar base stays saturated with water for much of the year and is subjected to numerous freeze-thaw cycles. Each time water within the pavement system freezes, it expands and erodes the saturated material, causing severe deterioration over time. The deteriorated mortar setting beds do not provide the necessary support for the pavers, and pavers become dislodged and sometimes damaged, requiring replacement (Atkinson, 2015).

**Figure 2-4. Moisture Trapped in Paver System**

![Diagram of paver system]

### 2.2.1.2 Trees

The tree selection process for the original Mall design resulted in selection of two tree species for the Mall trees: honey locust for the symmetrical median blocks and red oak for the asymmetrical blocks. Today, many of the Mall’s trees and associated irrigation systems are failing. Most of the surviving trees on the Mall within the Project limits are honey locusts. All but seven of the original 83 red oaks have died. The remaining trees have reasonably good health for short-term survival, but only 18 percent are healthy enough for longer-term survival; none are in excellent health. Most of the issues associated with the trees on the Mall are attributable to poor soil conditions, inadequate soil volume in tree boxes, and poor nursery practices prior to the purchase and installation of the trees. Tree boxes on the Mall have a soil volume of 300 cubic feet, and current best practices recommend 1,000 cubic feet as a minimum soil volume (Urban Trees + Soils, 2017). Moreover, the irrigation system needs repair to address leaks throughout the system. The placement of trees within the pattern and the allée between the blocks are key elements of the Mall design.
2.2.1.3 Outdated Power and Communications Technology

Public use, commerce, and programming on the Mall is becoming more reliant on modern technology. More accessibility to electrical outlets and electrical capacity is needed to serve the current programming on the Mall, and fiber optic cable is needed to meet demands for modern technology on the Mall, including security cameras and wi-fi for Mall visitors.

2.2.1.4 Maintenance

Due to the underlying drainage deficiencies with the Mall’s design, replacing pavers is not a permanent solution. In many cases, especially at the ends of blocks and adjacent to curbs, pavers are continually replaced in the same location within the transit way (RTD, 2015a). Figure 2-5 illustrates the location of paver replacements between 2004 and 2014 in the transit way between Larimer and Lawrence Streets. This pattern of pavement system deterioration is common within the Project limits.

Figure 2-5. Paver Replacement in the Mall Transit Way from 2004 to 2014, Larimer to Lawrence Streets

Note: Red areas signify replaced pavers.
Source: RTD, 2015a

Maintenance costs for the transit way have steadily increased over the years, with a sharp increase occurring in 2006. Between 2006 and 2016, maintenance costs for the RTD transit way averaged nearly $810,000 annually. The cost of maintaining the RTD transit way in 2018 approached $1.3 million, and future costs are projected to increase. Maintenance activities in Mall areas outside of the transit way are conducted by the BID. Paver maintenance in the transit way and pedestrian walks has generally required increasing funds each year, on average, as the overall condition of the transit way continues to deteriorate. As noted previously, settlement funds related to the paving claims expired in 2012, and this supplemental source of funding is no longer available to help offset the increasing maintenance costs.

2.2.2 Improving Safety

The current Mall design does not incorporate current best practices for pedestrian and transit way safety. The volume of pedestrians and buses (described in Section 2.2.3) using the Mall exacerbates safety conflicts.

Current national guidance and RTD standards recommend visually and physically separating walkways from transit lanes to minimize instances of pedestrians inadvertently walking into transit lanes. Federal Highway Administration’s (FHWA) Pedestrian Safety Guide and
Countermeasure Selection System (2013) recommends a buffer zone between 4 and 6 feet wide to separate pedestrians from the street, noting that street furniture, or an amenity zone such as the one illustrated on Figure 2-6, is typically appropriate in downtown or commercial areas (FHWA, 2013). The National Association of City Transportation Officials (NACTO) recommends an amenity zone with street furniture (such as benches, greenery, bollards, street lights, and bicycle parking) be used to delineate between the two areas (NACTO, 2013 and 2016). RTD Bus Infrastructure Design Guidelines and Criteria require that pedestrian/transit conflicts be eliminated, or at the least minimized, by separating pedestrian pathways from active bus lanes (RTD, 2016a).

Figure 2-6. Amenity Zone, Portland Transit Mall, Oregon

2.2.2.1 Spatial Configuration of Symmetrical Median Blocks and Narrow Side of Asymmetrical Blocks

In the symmetrical median blocks and on the narrow side of the asymmetrical blocks, the pedestrian walkways are too narrow to meet the CCD standard for 10-foot clear, unobstructed sidewalk widths downtown (CCD, 1993) and to carry peak hour pedestrian volumes (pedestrian volumes and mobility are discussed in detail in Section 2.2.3). These undersized pedestrian walkways are immediately adjacent to the transit way, with no clear visual or physical delineation between the pedestrian walkways and the transit way, other than 4-inch curbs of the same material and color as the adjacent surfaces, which were designed purposefully to blend in with the surrounding pavement pattern. During crowded conditions, transit-pedestrian conflicts worsen as pedestrians walk into the adjacent transit way or immediately adjacent to the transit way where they could be hit by Free MallRide shuttle mirrors or cause shuttles to stop sharply (hard stop).

On the west sides of the asymmetrical blocks, the wider pedestrian areas include an amenity zone with a row of trees to separate and delineate the pedestrian walkway from the transit way. This is more consistent with standards and guidance and, based on Mall safety data, results in safer conditions.
An analysis of RTD Free MallRide incident reports and claims data provided by RTD from 2007 to 2017 shows five times as many pedestrian-transit incident reports were made for symmetrical median blocks as for asymmetrical blocks, and more than twice as many hard stop reports (where the shuttle braked quickly, presumably to avoid hitting something or someone) and overall claims for Mall incidents made against RTD occurred on median blocks as asymmetrical blocks. Within the Project limits, there are seven symmetrical median blocks (Arapahoe Street to Tremont Place) and five-and-a-half asymmetrical blocks (Market Street to Lawrence Street and Court Place to Broadway). The incidents were located by intersection and stratified into three groups by roadway cross-section: symmetrical median cross-section (Curtis Street to Glenarm Place), asymmetrical cross-section (Market Street to Lawrence Street and Court Place to Broadway), and transition points at the intersections of Arapahoe Street and Tremont Place. The transition points were classified separately because of the unique situation of the cross-section and transit alignment shifts that occur as the asymmetrical blocks transition to symmetrical median blocks and back to asymmetrical blocks.

From 2007 to 2017, 63 pedestrian-transit claims were reported, with 21 injury claims, averaging about 2 per year. Of the pedestrian claims that reported an injury, 16 occurred within the symmetrical median blocks, 3 occurred surrounding the transitions between symmetrical and asymmetrical blocks, and 2 occurred in asymmetrical blocks.

Of all pedestrian claims made against RTD, 47 occurred on symmetrical median blocks, 4 occurred on the transitions between symmetrical and asymmetrical blocks, and 9 occurred on asymmetrical blocks. There were approximately 5 times as many pedestrian-transit claims on symmetrical median blocks as on asymmetrical blocks.

RTD hard stop report data were also assessed (RTD, 2017c) for the time period 2007 to 2017. It could be inferred that the shuttle driver had to make a hard stop for a reason, possibly because of something or someone in the transit way. More than twice as many hard stop reports occurred on symmetrical median blocks than on asymmetrical blocks. Of all the hard-stop-related reports within the 12.5 blocks of the Mall Project limits, 124 reports were prepared for incidents which occurred on symmetrical median blocks, 18 occurred surrounding the transitions between symmetrical and asymmetrical blocks, and 59 occurred on asymmetrical blocks.

From 2007 to 2017, RTD assessed claims data (RTD, 2017d) and determined nearly three times the number of claims were made on symmetrical median blocks than asymmetrical blocks. Of all claims within the Project limits, 359 occurred on symmetrical median blocks, 50 occurred surrounding the transitions between symmetrical and asymmetrical blocks, and 134 occurred on asymmetrical blocks.

Pedestrian count data from 2015 and 2016 (Gehl, 2016) were evaluated to assess whether larger pedestrian counts in the symmetrical median blocks could be driving an increase in pedestrian-transit incidents, hard stop-related reports, and overall pedestrian claims on median blocks. The pedestrian count data show there is approximately 57 percent greater average pedestrian volume within the symmetrical median blocks, compared to 420 percent more pedestrian-transit incidents reported, 110 percent more hard stops, and 170 percent more pedestrian claims in these blocks. Thus, there appears to be a higher frequency of pedestrian-transit incidents, hard stop-related reports, and overall claims per pedestrian in the symmetrical median blocks than the asymmetrical blocks.
These data support the conclusion that on the symmetrical blocks with center medians, undersized pedestrian walkways immediately adjacent to, and poorly delineated from, the transit way correlate to increased potential conflicts between pedestrians and transit.

2.2.2.2 Pavement Surface
In addition to the spatial configuration of the Mall design, the pavement surface has become dulled and slippery. The original granite pavers were finished with a flamed (rough) finish to provide traction for pedestrians and vehicles. Dirt has filled the finish of the granite pavers, creating a smooth surface that presents a safety hazard for pedestrians and vehicles and further limits the visual distinction between the paver colors. When the pavers are wet or icy, pedestrians slip on the slick surface, and the Free MallRide shuttles have a difficult time gaining traction to start and stop. Uneven surfaces causing tripping hazards, especially for individuals with physical disabilities, are also common due to the drainage and freeze-thaw patterns that cause pavers to break or become loose.

2.2.3 Improving Mobility
Pedestrian and transit use of the Mall is high, and serving both modes is important to accommodate mobility on the Mall. The Free MallRide service ridership currently has approximately 39,000 riders each weekday; this number is anticipated to increase to approximately 70,000 passengers per day by 2035 (RTD, 2017a and 2017b).

National guidance from FHWA’s Pedestrian Safety Guide for Transit Agencies (2008) states that pedestrian walkways should be wide enough to accommodate the expected levels of pedestrian traffic. The guide notes that narrow pedestrian walkways that cannot accommodate the volume of foot traffic may encourage pedestrians to walk in the roadway or take alternate routes, increasing the potential for conflict with motor vehicles (FHWA, 2008). For pedestrian mobility, 2 feet of pedestrian walkway width can comfortably carry approximately eight pedestrians per minute (Gehl, 2016). This guidance on pedestrian flows and sidewalk capacity is similar to that of the Transit Capacity and Quality of Service Manual (Transportation Research Board, 2013) and Highway Capacity Manual (Transportation Research Board, 2010). Adding 2 feet to a sidewalk benefits pedestrian mobility in a manner similar to adding an extra lane of highway capacity for vehicle mobility.

Peak hour pedestrian volumes currently exceed the carrying capacity of the pedestrian walkways on the symmetrical median blocks east of Arapahoe Street. The current capacity of the two 8-foot pedestrian walkways on the symmetrical median blocks is approximately 3,840 pedestrians per hour, while the current capacity of the 8- and 10-foot pedestrian walkways on the asymmetrical blocks is approximately 4,320 pedestrians per hour. Volumes in the median blocks on the end of the Mall reach up to 4,100 pedestrians per hour during the peak weekday lunch hour, based on hourly pedestrian counts taken by CCD in 2015 and 2016, shown in Table 1-1 (Gehl, 2016). On the western end of the Mall Project area (west of Arapahoe Street), volumes reach up to 3,000 pedestrians per hour near, and pedestrian walkways are adequate width to support current pedestrian volumes.
Table 1-1. 2015 and 2016 Average Peak Hour Pedestrian Volumes for Representative Blocks on the Mall

<table>
<thead>
<tr>
<th>Location</th>
<th>Average Peak Hour Pedestrian Volume Count, Weekdays</th>
<th>Average Peak Hour Pedestrian Volume Count, Weekends</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lawrence to Arapahoe</td>
<td>2,958</td>
<td>2,016</td>
</tr>
<tr>
<td>Champa to Stout</td>
<td>3,870&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4,704&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Welton to Glenarm</td>
<td>4,146&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3,672</td>
</tr>
<tr>
<td>Court to Tremont</td>
<td>2,940</td>
<td>3,738</td>
</tr>
</tbody>
</table>

Source: Gehl, 2016.

<sup>a</sup> Pedestrian volume exceeding pedestrian walkway capacity.

Pedestrian volumes are projected to increase in the future as downtown employment, population, and ridership grow. Future (2040) midday peak pedestrian volumes are estimated at 4,800 pedestrians per hour on the eastern end of the Mall and 4,000 pedestrians per hour on the western end of the Mall, based on existing peak hour pedestrian volumes growing at rate of forecasted employment growth from 2015 to 2040 of 0.7 percent annually in the Central Business District neighborhood (Project area east of Arapahoe Street) and 1.2 percent annually in the DUS neighborhood (Project area west of Arapahoe Street) (FTA, 2019 [Appendix B, Land Use and Socioeconomic Existing Conditions technical memorandum, Table 4]). Future peak hour pedestrian volumes would exceed current pedestrian walkway capacity on the east end of the Mall in the Central Business District neighborhood; the western end of the Mall in the DUS neighborhood has adequate capacity to support future pedestrian volumes.

The 8-foot pedestrian walkways on the median blocks and narrow sides of the asymmetrical blocks do not meet CCD standards for downtown sidewalk width of 10 feet. The CCD Streetscape Design Manual requires 10-foot sidewalk width in downtown, and states that this path must be maintained as a clear unobstructed pedestrian path (i.e., no encroachments of furnishings or other amenities) (CCD, 1993). During peak hours, the walkway capacity is further reduced, as people gathering at Free MallRide shuttle stops obstruct the walkways. Reliable Free MallRide service coupled with increased pedestrian walkway space is needed to accommodate mobility.

RTD research shows that approximately 10 percent of the Free MallRide users have a disability or medical condition that prevents them from operating a motor vehicle (RTD, 2017e). Although the design of the Mall preceded the 1990 Americans with Disabilities Act (ADA), the Mall incorporates many of the features of ADA accessibility, such as curb ramps, that are now required. However, furnishings and other elements (for example, fountains) in the median and the volume of pedestrian traffic at times obstruct clear paths of travel and makes access by people using wheelchairs difficult (Business Improvement District [BID] et al., 2010). A Discussion of Accessibility Issues for the 16th Street Mall Project (MTC, 2010) provides an evaluation of existing conditions and notes, among other observations, that the medians present challenges for accessibility.
2.2.4 Enhancing Public Use

The Mall configuration does not provide flexibility to allow for safe and comfortable transit use and pedestrian circulation while providing adequate space for quality public gathering opportunities. As use of the Mall has increased with Denver’s growing population and successful revitalization of the downtown, partially spurred by the Mall itself, the spatial configuration of the design does not provide the multi-functionality needed to accommodate transit and a variety of uses and installations for placemaking.

The CCD study *Downtown Denver 16th St Mall: Small Steps Towards Big Change* (Gehl, 2016), also called the Gehl study, evaluated how people currently use the Mall and recommended steps to increase its use as a destination. The study found that only 1 percent of people moving through the Mall stop to spend time on the Mall on an average weekday; this number increases to 3 percent on weekends. As a great public space, the Mall needs to attract more people engaged in staying and gathering activities.

The study evaluated which conditions within the Mall’s existing configuration increased the number of people spending time on the Mall by setting a baseline for Mall use without special programming, then experimenting with selected conditions and observing the results. Expanded patio seating had the largest positive effect on people spending time on the Mall, followed by live music and elements such as interactive water zones and interactive art. Removable seating and other temporary installations provided additional invitations for people to stay on the Mall.

Patios and café seating have been a part of the Mall’s design since its inception, with the pedestrian areas closest to the buildings considered “quasi-private spaces – adjuncts to the shops themselves” (Pei & Partners, 1977), and continue to be a successful use of space over 30 years later. Restaurants and bars along the Mall, many of which use patio or café space on the Mall, are retail destinations. These and other retail destinations attract users to the Mall, some of whom use the Free MallRide shuttle service. These users benefit RTD transit service by paying fares for transit service to downtown and increasing Free MallRide ridership; RTD receives FTA funding for a portion of the Free MallRide fixed guideway transit service, based on ridership. In addition, business owners using a patio or café space pay a licensing fee to the BID and the BID uses those funds to maintain and improve the Mall and downtown (including providing the majority of the funding for this Project). Patio use also increases natural surveillance and ownership/territoriality of the Mall, in accordance with Crime Prevention Through Environmental Design (CPTED) principles, discouraging negative social behavior, and improving safety for all Mall users, including riders on the Free MallRide and those waiting at Free MallRide shuttle stops.

The current design of the Mall, especially the symmetrical median blocks, hinders how people use the Mall, because it does not successfully realize key urban design principles for public use, including CPTED principles described in this section. Within the symmetrical blocks, transit lanes separate the public realm and pedestrian space into three separate zones, each on its own too small to provide safe and engaging spaces for public uses and amenities. These blocks contain two 8-foot-wide pedestrian walkways, two 9-foot-wide patio and gathering spaces, two 12-foot-wide transit lanes, and a 22-foot-wide median (Figure 2-7). While the 22-foot-wide median theoretically provides adequate pedestrian space, the usable space is much narrower because it is surrounded by transit lanes and rows of lights and trees with no natural edges that provide
comfortable gathering spaces. This is further exacerbated by furniture, food vendors, and kiosks that occupy the median. The existing design of the symmetrical blocks no longer serves to benefit safe and comfortable public use of the Mall in present times.

Figure 2-7. Cross-section of Existing Median Blocks

Personal safety along the Mall is also of concern. Public and stakeholder feedback indicates, generally, a negative perception of safety on the Mall. CPTED is an internationally-accepted approach to deterring criminal behavior through environmental design. The following CPTED principles promote the design, maintenance, and use of the built environment to enhance quality of life and to reduce both the incidence and fear of crime:

- **Natural surveillance** – clear sight lines such that public spaces are visible to others; a person is less likely to commit a crime if they think someone will see them do it.

- **Territoriality** – physical definition of public spaces that allows for active “ownership” of the public space; potential trespassers perceive this ownership and are discouraged from illicit activities.

- **Access control** – use of walkways, lighting, and landscape to direct the flow of people while decreasing the opportunity for crime.

- **Management and maintenance** – well-managed and maintained properties make places safer.

- **Activity support** – activities in public spaces increase legitimate public use and discourage illicit activities by people desiring anonymity for their actions.

The median spaces on the symmetrical blocks are set apart from other pedestrian areas physically and by transit service, which isolates the areas, restrict natural surveillance, and result in low ownership of the space by adjacent businesses and users; as a result, the space lacks consistent activation. Activating public space is essential to the perception of safety; when more people gather outside, the sense of safety increases and negative social behaviors decrease (Gehl, 2016). The median space on the symmetrical blocks, while slightly larger than the pedestrian walkways and patio/gathering areas to the sides of the Mall, can only be
accessed by crossing the transit way, and on its own is too small and isolated in between the transit lanes to provide adequate and comfortable gathering space for pedestrians.

The Mall symmetrical block medians offer no natural edges, such as buildings or hedges, for people to stay by; instead, people sit or stand in the center and look out toward the shuttle traffic surrounding them. In his book *Life between Buildings* (Gehl, 1971), urbanist Jan Gehl observes that the success of public spaces is intricately connected to the levels of pedestrian flow and stationary activity that prompt social interaction. Gehl, whose studio conducted the recent study of public use on the Mall (Gehl, 2016), finds that short distances between destinations complemented by street furniture encourage people to linger. He finds that “soft edges” between parks and public areas, especially places where people can sit and face the pedestrian flows, create some of the most vibrant areas of a city.

Gehl distinguishes among necessary/functional activities (such as going to work or waiting for a bus), optional/recreational activities (such as taking a walk for fresh air or sitting and sunbathing), and social activities (those that depend on the presence of others, children at play, greeting and conversations) in public spaces. While necessary activities take place regardless of the quality of the physical environment, optional activities depend to a significant degree on what the place has to offer and how it makes people behave and feel about it. The better a place, the more optional activity occurs and the longer necessary activity lasts. Social activity is the fruit of the quality and length of the other types of activities, because it occurs spontaneously when people meet in a particular place. Communal spaces in cities become meaningful and attractive when all activities of all types occur in combination and feed off each other.

In his later book, *Cities for People* (Gehl, 2010), Gehl explains that “wherever people stay for a while, they seek out places along the edges of spaces (...) the preference for staying at the edges of spaces is closely tied to our senses and social contact norms (...)” and that city space without edges provides poor conditions for staying.

When the shuttles were removed during select weekends in the summers of 2015 and 2016 to allow for wider programming during City-sponsored events, called “Meet in the Street,” the use of the median space nearly doubled from 18 to 34 people per median per symmetrical block. The Gehl study concluded that the Mall medians, as they currently function on the symmetrical blocks, are not comfortable public spaces to stay. The dimensions of the medians are too narrow to program the space with diverse kinds of furniture and activities to create a comfortable internal environment next to the transit way.

The center medians are also not comfortable places to walk, regardless of how many or few furnishings and amenities are in them. Data collected for the Gehl study showed that regardless of the day of week, very few people (4 percent to 11 percent) walk in the median (Gehl, 2016). The lack of use is typical of uncomfortable spaces, as urbanist William Whyte, who led the Street Life Project, found in his pioneering study of pedestrian behavior and city dynamics in the early 1970s. Whyte noted that “people vote with their feet - they use spaces that are easy to use, that are comfortable. They don’t use the spaces that are not.” (Whyte, 1980). Just as the medians are too narrow for comfortable public use, so are the pedestrian walkways and patio/gathering areas on the median blocks and narrow sides of the asymmetrical blocks, which are not wide enough to allow for a CCD standard 10-foot pedestrian walkway, amenity zone between the pedestrian walkway and transit way, and a 9-foot patio/gathering space.
Activating public space is essential to a successful communal space. Patio seating draws more people to gather on the Mall than any other activity (Gehl, 2016), and the provision of patio space is essential to successful public use of the Mall.

The design of the asymmetrical blocks is more conducive to quality public gathering spaces because public space is consolidated into two zones, rather than three, and the wide side of the block adheres to the key urban design and CPTED principles previously discussed. Public gathering opportunities are greater on the wider side of the block, with its double row of trees and ample space for both walking and staying activities, than on the narrower side, which lacks trees and lighting and has less space for both walking and staying activities. The narrow side also lacks the needed physical and visual delineation between the transit way and pedestrian walkway.

The half-block Gateway Plaza between Cleveland Place and Broadway has a different design and use than the rest of the Mall and serves as a gateway plaza to the Mall. It is located where the downtown diagonal street grid meets the surrounding north-south street grid at Broadway, forming a triangle-shaped block. The half-block sits across from Civic Center Station, and there are no shuttle stops on the half-block. The transit lanes are arranged in the same configuration as on the asymmetrical blocks, separated by a small median with light fixtures. Although the plaza is bounded by high-volume roadways, the double row of trees and triangular-shaped plaza with a fountain provide space for walking and staying activities similar to the asymmetrical blocks. Public use on this block is also enhanced by unmarked bicycle lanes travel between the trees and the fountain, north of the transit way, that connect to the bicycle lanes on Cleveland Place and on 16th Street east of Broadway.

2.3 Organization of this Evaluation

The sections within this evaluation are organized to follow the major analysis processes outlined in the Section 4(f) Policy Paper (FHWA, 2012).

- **Section 3** – Identification of Section 4(f) Resources
- **Section 4** – Avoidance Analysis
- **Section 5** – Least Overall Harm Analysis
- **Section 6** – All Possible Planning to Minimize Harm
3 Identification of Section 4(f) Properties

3.1 Parks and Recreation Resources

Non-historic Section 4(f) properties were identified within the study area between DUS on the west, Civic Center Station on the east, 15th Street on the south, and 17th Street on the north, as shown on Figure 3-1.

Within the study area, one Section 4(f) park or recreational resource has the potential to be affected by the Project: Skyline Park. Skyline Park is an important local park complex constructed in 1973 and owned and managed by CCD. The park parallels the Mall along the western side of Arapahoe Street between 15th and 16th Streets, 16th and 17th Streets, and 17th and 18th Streets (Figure 3-1). The cross streets of 15th, 16th, 17th, and 18th Streets do not contain park features. The Daniels and Fisher (D&F) tower at the corner of 16th and Arapahoe Streets is within the park boundaries but not associated with the park (the tower was constructed in 1911 and is a Denver Landmark).

Figure 3-1. Skyline Park
The park features (Figure 3-1) include grassy areas that support a variety of seasonal activities and events, including games, a beer garden, culinary markets, and concerts. During the summer, Skyline Park has a nine-hole miniature golf course and a pop-up dog park. During the winter holidays, Skyline Park is converted into an outdoor ice-skating rink for use by the public. Only the portion of the park between 15th and 16th Streets is currently open to the public.

Skyline Park would not be affected by the Project. The park is located outside of the Project limits. Construction of the Project would not necessitate any acquisition of land nor permanent or temporary changes to Skyline Park use or access. No construction activities would occur on park property. Therefore, there is no Section 4(f) use of Skyline Park.

### 3.2 Historic Properties

#### 3.2.1 Historic Properties in the Study Area

An Area of Potential Effects (APE) for historic properties for the Project was established during the Section 106 consultation process with the Colorado SHPO and identified consulting parties starting in Spring 2017. The APE includes 16th Street from Market Street to Broadway and one parcel on each side of the corridor, as shown on Figure 3-2.

The APE encompasses the area where the direct and indirect effects of a project may cause alterations in the character of historic properties. The APE also informs the areas of potential direct use (permanent incorporation), temporary use, and constructive use of Section 4(f) historic properties.
Figure 3-2. Area of Potential Effects and Boundary of the 16th Street Mall Property
Historic properties were identified through the Section 106 consultation process. Results of the historic surveys and determinations of eligibility and additional details about the Project effects to historic properties can be found in the Cultural Resources Technical Report in Appendix A.

As summarized in Table 3-1, 32 historic properties are located within the APE, including the 16th Street Mall itself and one archaeological site. One property, the 16th Street Mall, results in a Section 106 adverse effect and a Section 4(f) direct use.

Table 3-1. Summary of Historic Properties, Section 106 Findings of Effect, and Section 4(f) Use

<table>
<thead>
<tr>
<th>Section 4(f) Historic Property Name</th>
<th>Address</th>
<th>NRHP Status</th>
<th>Section 106 Finding of Effect</th>
<th>Section 4(f) Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>16th Street Mall</td>
<td>1-1300 16th Street</td>
<td>NRHP-Eligible</td>
<td>Adverse Effect</td>
<td>Direct Use</td>
</tr>
<tr>
<td>Steel Building; Fontius Building; Sage Building</td>
<td>1555 Welton; 600 16th Street</td>
<td>NRHP-Listed</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Liebhardt Building; Cottrell Clothing Company</td>
<td>601 16th Street</td>
<td>NRHP-Listed</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Daniels &amp; Fisher Tower</td>
<td>1101 16th Street; 1601 Arapahoe Street</td>
<td>NRHP-Listed</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Denver Dry Goods Company Building</td>
<td>702 16th Street; California Street; and 16th Street</td>
<td>NRHP-Listed</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Masonic Temple Building</td>
<td>1614 Welton Street, 535 16th Street</td>
<td>NRHP-Listed</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Kittredge Building</td>
<td>511 16th Street</td>
<td>NRHP-Listed</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>A.C. Foster Building; University Building</td>
<td>910-918 16th Street</td>
<td>NRHP-Listed</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Joslin Dry Goods Company Building; Tritch Building; Savoy Grille</td>
<td>934-938 16th Street</td>
<td>NRHP-Listed</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>A.T. Lewis and Son Department Store; Holtzman and Appel Block</td>
<td>800-816 16th Street</td>
<td>NRHP-Listed</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Neusteter Building</td>
<td>720-726 16th Street</td>
<td>NRHP-Listed</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Section 4(f) Historic Property Name</td>
<td>Address</td>
<td>NRHP Status</td>
<td>Section 106 Finding of Effect</td>
<td>Section 4(f) Use</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>---------</td>
<td>-------------</td>
<td>------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>McClintock Building</td>
<td>1554 California Street</td>
<td>NRHP-Listed</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Independence Plaza; Prudential Plaza</td>
<td>1001 16th Street 1050 17th St.</td>
<td>NRHP-Eligible</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Bridgepoint Plaza; Park Central</td>
<td>1110 16th Street; 1515 Arapahoe Street; 1111 15th Street</td>
<td>NRHP-Eligible</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Security Life Building; 1600 Glenarm Place</td>
<td>1616 Glenarm Place</td>
<td>NRHP-Eligible</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Hilton Hotel; Radisson Hotel; Adams Mark Hotel</td>
<td>1550 Court Place</td>
<td>NRHP-Eligible</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Dome Tower; Great West Plaza; World Trade Center</td>
<td>1625 Broadway</td>
<td>NRHP-Eligible</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Zeckendorf Plaza; May D &amp; F Plaza; Hyperbolic Paraboloid</td>
<td>350 16th Street; 1550 Court Place</td>
<td>NRHP-Eligible</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Colorado Federal Savings</td>
<td>200 16th Street</td>
<td>NRHP-Eligible</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Petroleum Club Building; Petroleum Building; 110 Building</td>
<td>110 16th Street</td>
<td>NRHP-Eligible</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Federal Reserve</td>
<td>1020 16th Street</td>
<td>NRHP-Eligible</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Symes Building; F.W. Woolworth Company</td>
<td>820 16th Street</td>
<td>NRHP-Eligible</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Hayden, Dickinson &amp; Feldhauser Building; Colorado Building</td>
<td>1609-1615 California Street</td>
<td>NRHP-Eligible</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Walgreens</td>
<td>801 16th Street</td>
<td>NRHP-Eligible</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Skyline Park Historic District</td>
<td>1500-1800 Arapahoe Street</td>
<td>NRHP-Eligible</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
<tr>
<td>Lower Downtown Denver Historic District</td>
<td>Multiple</td>
<td>NRHP-Eligible</td>
<td>No Adverse Effect</td>
<td>None</td>
</tr>
</tbody>
</table>
### Section 4(f) Historic Property Name

| 16th Street Historic District | Multiple | NRHP-Eligible | No Adverse Effect | None |
|-----------------------------------------------------------|
| Waters Building – Market Center | 1642 - 1644 Market Street | Contributes to Lower Downtown Denver Historic District | No Adverse Effect | None |
| Hitchings Block | 1620 Market Street | Contributes to Lower Downtown Denver Historic District | No Adverse Effect | None |
| Liebhardt-Linder Building – Market Center | 1624 Market Street | Contributes to Lower Downtown Denver Historic District | No Adverse Effect | None |
| McCrary Block – Market Center | 1628 Market Street | Contributes to Lower Downtown Denver Historic District | No Adverse Effect | None |
| Former Denver Tramway Trolley line (segment) | E. 16th Avenue to Cleveland Place | NRHP-Eligible (historic archaeological linear property) | No Historic Properties Affected | None |

*a The Denver Trolley line property is outside the limits of construction and would not be affected by the Project. For the purposes of the Section 4(f) evaluation, the property’s importance for preservation in place was not assessed, and it was considered a Section 4(f) resource.

**Notes:**

NRHP = National Register of Historic Places

Outside of the 16th Street Mall Historic Property, the Project would not require use of historic buildings or districts. FTA determined and SHPO concurred that No Adverse Effect to historic properties would result for any historic property other than the 16th Street Mall property. Because no direct incorporation of land would be required, no impacts of any kind, including *de minimis* impacts, are expected for these properties. Proximity impacts would not adversely affect the historic properties along the Mall nor constitute a constructive use.

No easements or other temporary occupancy of land from historic properties would be needed, and access to the properties would be maintained throughout construction. The historic buildings and districts all pre-date the construction of the Mall. Although vibration and other construction activities would be similar to the Mall’s original construction, which did not adversely affect these historic properties, CCD will require the construction contractor to monitor vibration during construction so that properties within the construction zone are not adversely affected by the Project. This commitment is included as a stipulation in the Section 106 Programmatic Agreement.
A detailed discussion of the 16th Street Mall historic property is included in Section 3.2.2. Evaluation of alternatives to avoid and minimize Section 4(f) use of the 16th Street Mall are included in Sections 4, 5, and 6.

3.2.2 Description of the 16th Street Mall Historic Property

The 16th Street Mall historic property was constructed between 1980 and 1982 as an approximately 80-foot-wide transit and pedestrian mall (transportation facility) that encompasses 12.5 blocks of 16th Street from Broadway on the east to Market Street on the west. This boundary (Figure 3-2) encompasses the original limits of the 1980 transit way and Mall and consists of three main sections, including seven symmetrical blocks in the center and five-and-a-half asymmetrical blocks on the ends. The portion of 16th Street west of Market Street was constructed and functionally incorporated into the Mall when Free MallRide service was extended west of Market Street Station to Wynkoop Street in 2001 and DUS in 2002. The extended portion of the Mall does not contribute to its historic significance (it is outside the historic boundary).

The Mall was envisioned as an urban renewal project in the 1970s to address post-World War II decline of downtown businesses and recreation, the loss of long-time streetcar public transportation on 16th Street, and increasing automobile congestion on Denver city streets. The goals of the project were to lessen traffic congestion, provide more efficient bus service, and create a new pedestrian environment in downtown. In 1977, RTD commissioned the renowned New York architectural firm of I.M. Pei & Partners, teamed with the Philadelphia landscape architectural firm of Hanna/Olin, for the Mall project.

The design was completed in 1980, and construction began in early 1981. The design concept took into consideration the existing scale of the street, with its variety of visual elements, buildings sizes and uses, and unique interest of the street. The challenge for the designers was to “create a unifying theme and common identity for the street, while protecting its distinctive personality” (I.M. Pei & Partners, 1977). At the time of its construction in 1980, the central portion of the corridor was lined with mostly late 19th-, early 20th-century, midsize structures (of 2 to 10 stories). At the ends, there were more modern buildings constructed during the urban renewal phases, some mid-century modern buildings designed and built in the 1960s and early 1970s, and several vacant or parking lots.

Although some of the structures have been removed (May D&F building and Zeckendorf Plaza) or significantly altered (Skyline Park) since the construction of the Mall in the early 1980s, the Mall still reflects the important historic development (and redevelopment) of downtown Denver and the efforts of historic preservationists to preserve the remaining historic buildings downtown, many of which had been razed in the 1960s and 1970s to make way for urban renewal/redevelopment.

Paving material is called out in the original planning document as the “single element” that would “establish the character of the mall,” and is one of the primary character-defining features of the Mall (I.M. Pei & Partners, 1977). The designers believed that landscaping, in particular, trees, would create the desired unifying theme as well as provide physical protection from the elements: “The location of trees is crucial” (I.M. Pei & Partners, 1977). Thus, for the symmetrical sections, the design placed them in the center, diagonally spaced, 32 feet apart so as not to block accessibility or visibility of the structures lining the Mall and to maintain the
visibility and unique visual qualities of the exiting street. The sidewalks were widened and considered quasi-private spaces that were essentially adjuncts to the shops lining the street.

The 16th Street Mall is eligible for listing in the NRHP under Criteria A and C at the local and state levels; its period of significance is 1980 to 1982, the period of its final design and construction. It is eligible under Criterion A in the areas of Transportation and Community Planning and Development for its role in transforming Denver’s downtown and revitalizing a fledgling commercial district affected by post-World War II development outside the city. It is significant under Criterion C in Landscape Architecture as an award-winning design by masters, built with granite units in a unique, enduring, western-style pattern consistent along 12.5 blocks. It is also significant under Criterion C in the area of Engineering for its largely hidden but sophisticated and complex matrix of drainage, irrigation and wiring, and for the suspended pavement system intended to accommodate large and deep root chambers for the shade trees (OAHP, 2018).

The essential elements of the design, according to the 1977 design concept document, are “paving, planting, and lighting” (I.M. Pei & Partners, 1977). The pavement design—precisely interwoven pavers in three colors unified by the tree plantings and light standards—took into consideration the existing scale and diagonal orientation of the street. The geometry of the pattern was based on a 45-degree diagonal grid, a reflection of the 45-degree intersection of 16th Street and Broadway and the downtown street system. This grid is represented in large and small diamond shapes throughout the pattern and the spatial arrangements of the trees and light standards. The diagonal grid was also intended to encourage diagonal movement of pedestrians within the Mall (I.M. Pei & Partners, 1977). Specially designed signage, planters, street furniture (such as benches and shelters), fountains, banners and other moveable objects (such as mailboxes, phone boxes, and trash receptacles) were carefully selected elements of the overall plan and were given a uniform design and placed along the street in a planned pattern (OAHP, 2018). The character-defining features of the 16th Street Mall design, as identified in the March 2018 Form 1403, are as follows:

- Consistent paving pattern design, including intricate patterning, geometry, scale, and coloring of the pavers and paving materials
- Granite paver units/modules with 1-foot 5-inch by 1-foot 5-inch dimensions, in three shades: charcoal gray, light gray, and “Colorado red” (specified as White, Black, and Red on the 1980 plans)
- Granite paver units/modules of charcoal and light gray for curbs, cuts, drains, and other applications
- Red oak and honey locust trees planted in specially-designed under-pavement concrete root boxes and ringed at the surface with custom-designed grates
- Custom-designed and -built light standards
- Custom-built street furniture (benches, shelters), fountains, and other moveable objects (mailboxes, phone boxes, trash and flower receptacles)
- Custom metal street signs on traffic signals

These features are generally retained in some form on the Mall today. Many of the granite pavers (and mortar joints) have been replaced in-kind due to damage. Most of the red oak trees
(76 of the original 83) have not survived, but the majority of the honey locust trees remain. The original light standards were replaced in 2016; they were replicated and returned to their original locations. Most of the custom-designed telephone stands have been removed, and most of the fountains are not active.

The inclusion of asymmetrical and symmetrical sections, unified by common design elements and pavement pattern, is a key feature of the design. The three sections, often referred to as rooms in the design, deliberately reflected the surrounding land uses and architecture and contribute to and enhance the experience of moving through the beginning, middle, and ends of the linear property.

In addition to the visible elements, the 16th Street Mall property is also significant for its largely hidden drainage, irrigation, wiring, and suspended pavement system that accommodates large and deep root chambers for the shade trees, as described in the Form 1403 (OAHP, 2018).
4 Avoidance Alternatives

FTA may not approve the use of a Section 4(f) property if there is a “feasible and prudent” avoidance alternative. Therefore, the Project Partners considered if any feasible and prudent avoidance alternatives were available. The following potential avoidance alternatives were evaluated for feasibility and prudence:

1) **No Build Alternative** – no changes to the Mall or Free MallRide service; continue ongoing maintenance and repair activities

2) **Reduce Transit Service on the Mall Alternative** – continue operation of the Free MallRide at a reduced service frequency and develop a new parallel transit service or increased Free MetroRide companion service (on 18th and 19th Streets) to accommodate ridership demand

3) **Partial Repair Alternative** – maintain the existing Mall design, retaining the existing granite paver system and not replacing the existing concrete sub-base slab; upgrade surface utilities; replace failing trees; and maintain planned Free MallRide service

4) **Rebuild in Existing Configuration Alternative** – reconstruct the Mall in its current spatial configuration and design, replace the pavement system and underground tree infrastructure, and maintain planned Free MallRide service

These alternatives are illustrated on Figure 4-1. The Reduce Transit Service Alternative would not construct any physical improvements to the Mall and thus is not illustrated on Figure 4-1.

From a Section 4(f) perspective, the No Build, Reduce Transit Service, and Partial Repair Alternatives are not strictly avoidance alternatives because all require some level of renovation or repair of the property. They are evaluated as avoidance alternatives, however, because they potentially avoid an Adverse Effect to the 16th Street Mall property, resulting in a *de minimis* impact, or potentially qualify for an exception ([23 CFR § 774.13(a)](https://www.cfr.text.uscode.gov/cgi-bin/text-lookup?cfrpart=774&cfrsection=774.13(a)) to Section 4(f) use if the work on the transportation facility could be conducted in a manner that did not adversely affect the historic property. The Rebuild in Existing Configuration is an alternative that could also potentially qualify for the cited restoration exception.
In accordance with Section 4(f) requirements, FTA evaluated whether the three potential avoidance alternatives were feasible and prudent. All potential avoidance alternatives were determined to be feasible because they could be built with sound engineering judgement, but none were determined to be prudent under prudency factors (i), (ii), or (iv), meaning they would not meet the Project’s purpose and need factor (i), would result in unacceptable safety or operational problems factor (ii), and/or would result in additional maintenance costs of an extraordinary magnitude factor (iv) as described in Sections 4.1 through 4.4.

4.1 No Build Alternative

The No Build Alternative would maintain the existing alignment and configuration of the Mall; continue current maintenance activities, including frequent repairs to the pavement system, and other infrastructure; and continue implementation of safety strategies, including DDP’s Security Action Plan.

The No Build Alternative would not be prudent under 23 CFR § 774.17 factor (i) because it compromises the Project to a degree that it is unreasonable to proceed with the Project considering its stated purpose and need. The purpose and need elements not met by the No Build Alternative are described in subsequent text.

- Address deteriorating infrastructure to allow reasonable maintenance frequency and costs to RTD and CCD. The No Build Alternative would not correct the drainage problem in the flawed pavement system. Water would continue to become trapped, granite pavers would continue to loosen during freeze-thaw cycles, and the pavers would continue to break over time. Even if action was deferred, the Mall would still need to be reconstructed or its infrastructure replaced in the future because problems would perpetuate. As such, the Mall would remain an ongoing maintenance problem and result in an unreasonable and expensive amount of continual construction to address the faulty infrastructure. These ongoing construction maintenance activities would continue to have adverse economic effects on businesses along the Mall, as well as lost-time impacts for transit users on the Mall. The No Build Alternative would not address other elements of the Mall (for example,
fountains, tree infrastructure, and electric power supply) that need rehabilitation and/or modernization.

- **Improve safety for pedestrians and vehicles.** The No Build Alternative would continue to have undersized pedestrian walkways immediately adjacent to the transit way, with no clear visual or physical delineation between them, other than 4-inch curbs of the same material and color as the adjacent surfaces. Pedestrian-vehicle conflicts and near-misses would continue to occur. The dulled and slippery finish of the pavers would not be addressed and would continue to cause pedestrian slips and falls, a loss of shuttle traction during inclement weather, and further limit the visual distinction between the paver colors.

- **Improve mobility for desired transit operations and for all users.** Maintenance of the failing pavement would result in increasingly frequent interruptions to Free MallRide service, affecting the ability of the Free MallRide to meet ridership demand and service plans. Pedestrian walkways would remain undersized for peak hour pedestrian traffic and impede pedestrian mobility. The pedestrian walkways and patio/gathering areas on the symmetrical median blocks and the narrow sides of the asymmetrical blocks would remain too narrow to meet the CCD standard for a 10-foot pedestrian walkway, provide an amenity zone for safety and public use between the pedestrian walkways and transit way, and maintain the existing 9-foot patio/gathering space.

- **Increase opportunities for public use of the Mall as an iconic civic space for leisure, commerce, and tourism.** The spatial configuration of the Mall would continue to inhibit positive public use of the Mall. The median space in between the transit lanes on the symmetrical blocks would remain too small to provide both adequate and comfortable gathering space and also pedestrian circulation around the gathering space. The isolation and lack of natural surveillance of the medians would persist, contributing to poor public use. The pedestrian walkways and patio/gathering areas on the symmetrical median blocks and the narrow sides of the asymmetrical blocks would remain too narrow to meet the CCD standard for a 10-foot pedestrian walkway, include an amenity zone for safety and public use between the pedestrian walkways and transit way, and maintain the existing 9-foot patio/gathering space.

The No Build Alternative would also not be prudent under prudency factor (ii) because unacceptable safety problems would persist. These problems are the result of pedestrian walkways that remain undersized and do not meet pedestrian demand; thus, conflicts between pedestrian and transit use of the Mall would persist, especially during peak periods of pedestrian volumes.

The No Build Alternative would not be prudent under prudency factor (iv) due to maintenance costs of an extraordinary magnitude. Maintenance costs associated with the deteriorated infrastructure have been approximately $1 million annually in recent years. For 2018, the costs approached $1.3 million, and future costs are expected to increase with no revenue stream to address these costs. The construction settlement that was paid to RTD to address additional maintenance associated with the construction flaws expired in 2014, and RTD considers it fiscally irresponsible to not seek a long-term solution.
4.2 Reduce Transit Service on Mall Alternative

This concept would entail the continued operation of the Free MallRide at a reduced service frequency to reduce the barrier effect of transit service on the medians on the symmetrical blocks—meaning, the discomfort and lack of access that transit traffic imposes on pedestrians trying to access the medians—and potentially reduce pedestrian conflicts with transit service and improve safety, compared to the No Build Alternative. To meet transit demand, RTD would need to accommodate the ridership affected by the reduced service on either a new parallel service or on RTD’s Free MetroRide that runs on 18th and 19th Streets during weekday morning and afternoon rush hours.

The Reduce Transit Service on Mall Alternative would not address the known construction flaw in the design of the pavement drainage system, but reduced bus use could reduce the wear and tear on the transit way; maintenance frequency and cost; and the disruption in transit operations if service (and use) was reduced and less maintenance was needed.

The Reduce Transit Service on Mall Alternative would not be prudent under factor (i) because it compromises the Project to a degree that it is unreasonable to proceed with the Project considering its stated purpose and need (23 CFR § 774.17). The purpose and need elements not met by the Reduce Transit Service on the Mall Alternative are described in subsequent text:

- **Address deteriorating infrastructure to allow reasonable maintenance frequency and costs to businesses and taxpayers.** The Reduce Transit Service on Mall Alternative would not correct the drainage problem in the flawed pavement system, which traps water and loosens the granite pavers during freeze-thaw cycles, causing the pavers to break, which occurs regardless of the frequency of shuttle use of the Mall. The Mall would need to be reconstructed or its infrastructure replaced at a future point in time. As such, the Mall would remain an ongoing maintenance problem and result in an unreasonable and expensive amount of continual construction to address the faulty infrastructure. These ongoing construction maintenance activities would continue to disrupt pedestrian use and transit service and would have adverse economic effects on businesses along the Mall. The Reduce Transit Service on Mall Alternative would not address other elements of the Mall (for example, fountains, tree infrastructure, and electric power supply) that need rehabilitation and/or modernization.

- **Improve safety for pedestrians and vehicles.** Fewer shuttles would travel in the transit way, reducing the potential for pedestrian/transit conflicts from existing conditions. However, the Reduce Transit Service on Mall Alternative would continue to have undersized pedestrian walkways immediately adjacent to the transit way, with no clear visual or physical delineation between them, other than 4-inch curbs of the same material and color as the adjacent surfaces. Although lower service frequency may reduce exposure, pedestrian-vehicle conflicts and near-misses would continue to occur. The dulled and slippery finish of the pavers would not be addressed, and safety would continue to be compromised because of pedestrian slips and falls, a loss of shuttle traction during inclement weather, and reduced visual distinction between uses intended to be provided by the paver pattern and colors.

- **Improve mobility for desired transit operations and for all users.** The Reduce Transit Service on Mall Alternative would not meet this Project need for the following reasons:
– It would decrease mobility by reducing transit service on the Mall and cost time for the Mall’s transit users.

– There is inadequate capacity on parallel routes to accommodate transit demand, so transit needs would not be met under this alternative (one of the Mall’s original and continued purposes is to reduce transit trips on downtown streets).

– Parallel routes increase travel times because of longer routes, buses operating in mixed traffic, and out-of-direction travel for riders to reach bus service on parallel streets.

– Providing a dedicated lane for or increasing frequency of transit service on parallel streets would reduce vehicle capacity on already-congested streets, particularly the immediately adjacent streets of 15th and 17th Streets.

– It would not meet pedestrian mobility needs because it would not provide adequately sized pedestrian walkways for pedestrian use. Pedestrian mobility on parallel streets would also be compromised because of increased vehicle activity and conflicts.

– Maintenance activities would continue to affect Free MallRide service even if frequency of service was reduced.

• Increase opportunities for public use of the Mall as an iconic civic space for leisure, commerce, and tourism. The Reduce Transit Service on Mall Alternative would reduce the frequency of bus service (and use) of the Mall, which might reduce the barrier effect of transit service on the medians, potentially reducing the isolated condition and improving natural surveillance of the medians on the symmetrical blocks. However, the spatial configuration issues of the Mall would persist. Median spaces in between the transit lanes on the symmetrical blocks would remain too small to provide both adequate and comfortable gathering space and pedestrian circulation around the gathering space. The isolation and lack of natural surveillance of the medians would persist, inhibiting positive public use. The pedestrian walkways and patio/gathering area on the symmetrical median blocks and the narrow sides of the asymmetrical blocks would remain too narrow to meet the CCD standard for a 10-foot pedestrian walkway, provide an amenity zone for safety and public use between the pedestrian walkways and transit way, and maintain the existing 9-foot patio/gathering space.

The Reduce Transit Service on Mall Alternative would also not be prudent under prudence factor (ii) because unacceptable safety problems would persist as a result of undersized pedestrian walkways that fail to meet pedestrian demand. As a result, pedestrian use of the transit way would continue, presenting unsafe conditions even if the transit use is reduced.

4.3 Partial Repair Alternative

The Partial Repair Alternative is based on the recommendation of the 16th Street Urban Design Plan (BID et al., 2010). This alternative would maintain the existing Mall design and thus would not likely adversely affect the historic qualities of the 16th Street Mall property, qualifying for an exception to Section 4(f) approval. It would entail the following infrastructure actions, described further in Appendix B.

• Retain existing granite paver system and do not replace the existing concrete sub-base slab. This alternative would be implemented by reusing the existing granite pavers. In the transit
lanes, the process would include cataloging the existing pattern, removing the existing pavers, cleaning and refinishing the pavers, improving the mortar base, and then resetting the pavers in their original location. In the pedestrian areas, the pavers would not be removed, but they would be refinished. The result would be a renovation of the existing paver system.

- Upgrade surface utilities, including power outlets, where needed.
- Replace failing trees but retain existing tree box infrastructure.
- Retain, improve, and reconfigure furnishings to support public use, pedestrian circulation, and ADA compliance in pedestrian areas.
- Retain and repair water features, including fountains and irrigation.

The Partial Repair Alternative would not be prudent under factor (i) because it compromises the Project to a degree that it is unreasonable to proceed with the Project considering its stated purpose and need (23 CFR § 774.17). The purpose and need elements not met by the Partial Repair Alternative are described in subsequent text:

- **Address deteriorating infrastructure to allow reasonable maintenance frequency and costs to businesses and taxpayers.** The Partial Repair Alternative would improve the mortar base to reduce the amount of water penetration, lessening the deterioration of the granite pavers and reducing maintenance frequency. However, the Partial Repair Alternative would not replace the underlying concrete sub-slab and thus would not correct the drainage problem; water that penetrates the mortar base would continue to loosen pavers and cause them to break. The Mall would still need to be reconstructed or its infrastructure replaced in the future. As such, the Mall’s infrastructure deficiencies would retain long-term (although potentially less frequent or severe short-term) maintenance problems.¹

- **Improve safety for pedestrians and vehicles.** The Partial Repair Alternative would not address the design issues associated with the symmetrical median blocks. Pedestrian walkways would remain undersized and located immediately adjacent to the transit way, with no clear visual or physical delineation between them, other than 4-inch curbs of the same material and color as the adjacent surfaces. Pedestrian-vehicle conflicts and near-misses would continue to occur.

- **Improve mobility for desired transit operations and for all users.** Maintenance of the pavement would continue to result in interruptions to Free MallRide service. Pedestrian walkways would remain undersized for peak hour pedestrian traffic, would remain narrower than CCD standard sidewalk widths, and would present continued accessibility issues, impeding pedestrian mobility.

- **Increase opportunities for public use of the Mall as an iconic civic space for leisure, commerce, and tourism.** The Partial Repair Alternative would retain the existing spatial configuration of the Mall, which would continue to inhibit positive public use of the Mall in some locations. The median spaces between the transit lanes on the symmetrical blocks would remain too small to provide both adequate and comfortable gathering space and

¹ Effects of the drainage issues less than 5 years after the Mall was constructed were severe enough to cause RTD to seek and the architect and contractor to agree to a 25-year settlement to address infrastructure problems.
pedestrian circulation around the gathering space. The isolation and lack of natural surveillance of the medians would persist, inhibiting positive public use. The pedestrian walkways and patio/gathering areas on the symmetrical median blocks and the narrow sides of the asymmetrical blocks would remain too narrow to meet the CCD standard for a 10-foot pedestrian walkway, provide an amenity zone for safety and public use between the pedestrian walkways and transit way, and maintain the existing 9-foot patio/gathering space.

Moreover, the Partial Repair alternative would also not be prudent under factor (ii) because it would not fully address the safety concerns articulated in the Project’s second need statement, thereby resulting in the continuation of unacceptable safety problems, particularly conflicts between pedestrian and transit uses.

4.4 Rebuild in Existing Configuration Alternative

The Rebuild in Existing Configuration Alternative would entail the following actions, described further in the Alternative Screening technical memorandum in Appendix B:

- Reconstruct the Mall in the same spatial configuration and design as it currently exists, replicating the existing configuration of the trees, light fixtures, transit lanes, and pedestrian areas.
- Fully comply with ADA standards, which could result in minor changes to the original Mall design.
- Replace the Mall’s pavement system with a new sub-base that drains properly and new granite pavers.
- Replace underground infrastructure and trees.
- Continue operation of the Free MallRide at RTD’s current and planned levels of service.

If the design and construction of the Rebuild in Existing Configuration Alternative could be completed in a manner that does not adversely affect the historic qualifies of the 16th Street Mall that support its eligibility for the NRHP, an exception to the use of the historic property could be applicable. However, due to the significant alterations needed to character-defining features, especially the reconstruction and reconfiguration of the drainage system and replacement of trees and associated irrigation systems, it is likely that the resource would still be adversely affected. In addition, the evaluation found that this alternative was also not prudent because although it addresses the infrastructure deficiencies better than any of the other avoidance alternatives considered, it still does not address the underlying spatial configuration of the Mall that affects safety and mobility, such as the undersized pedestrian walkways and proximity of transit to pedestrians, as described for the other avoidance alternatives.

While the Rebuild in Existing Configuration Alternative would address the need to improve deteriorating infrastructure and allow reasonable maintenance frequency and costs to businesses and taxpayers, it would not be prudent under factor (i) because it would not meet the following Project needs:
• Improve safety for pedestrians and vehicles. The Rebuild in Existing Configuration Alternative would continue to have undersized pedestrian walkways immediately adjacent to the transit way. Pedestrian-vehicle conflicts and near-misses would continue to occur.

• Improve mobility for desired transit operations and for all users. Pedestrian walkways would remain undersized for peak hour pedestrian traffic, would remain narrower than CCD standard sidewalk widths, and would present continued accessibility issues, impeding pedestrian mobility.

• Increase opportunities for public use of the Mall as an iconic civic space for leisure, commerce, and tourism. The spatial configuration of the Mall would continue to inhibit positive public use of the Mall and the Free MallRide in some locations. The median spaces in between the transit lanes would remain too small on the symmetrical blocks to provide both adequate and comfortable gathering space and pedestrian circulation around the gathering space. The isolation and lack of natural surveillance of the median spaces would persist, inhibiting positive public use. The pedestrian walkways and patio/gathering areas on the symmetrical median blocks and the narrow sides of the asymmetrical blocks would remain too narrow to meet the CCD standard for a 10-foot pedestrian walkway, provide an amenity zone for safety and public use between the pedestrian walkways and transit way, and maintain a 9-foot patio/gathering space.

Moreover, the Rebuild in Existing Configuration Alternative would also not be prudent under prudence factor (ii) because it would not address the safety concerns associated with the configuration of the symmetrical median blocks articulated in the Project’s second need statement, thereby resulting in the continuation of unacceptable safety problems.
5 Least Overall Harm Analysis

The Section 4(f) regulations [23 CFR § 774.3] state that if there is no feasible and prudent alternative that avoids the use of Section 4(f) properties, FTA “may approve only the alternative that causes the least overall harm in light of the statute’s preservation purpose.” In determining the least overall harm, the seven factors described in Section 1.3.2 are considered.

The 16th Street Mall is the only Section 4(f) property resulting in a Section 4(f) use and being considered in this least harm analysis. There are no alternatives that maintain the existing spatial configuration of the Mall while addressing the Project needs and, therefore, there is no prudent and feasible alternative that avoids an adverse effect to the historic property. Three alternatives for the transit way alignment were considered for the Least Overall Harm Analysis. These alternatives vary in how they rebuild the asymmetrical end blocks of the Mall and are discussed in Section 5.1. Additionally, three transit way curb options were considered in the Least Harm Analysis. The curb options could be applied to any of the alternatives and are therefore considered separately in Section 5.2.

5.1 Alignment Alternatives

Three alternatives were studied that would meet or partially meet the Project purpose and need and would therefore be prudent and feasible, and they are considered for this Least Overall Harm Analysis:

The **Locally Preferred Alternative (LPA)** would rebuild the seven symmetrical median blocks with new center-running transit lanes, rebuild five of the asymmetrical blocks with a new asymmetrical configuration, and rebuild the one-half-block Gateway Plaza in its current and historic configuration.

The **LPA Design Option** would rebuild the seven symmetrical median blocks with new center-running transit lanes, convert two blocks of the existing asymmetrical sections (one additional block on each side) to center-running transit, rebuild the remaining three asymmetrical blocks with a variation on the LPA’s asymmetrical configuration, and rebuild the one-half-block Gateway Plaza in its current and historic configuration.

The **Center Running Alternative** would rebuild all 12.5 blocks of the Mall with a center-running transit configuration.

The plan views for these alternatives are illustrated on Figure 5-1.
As described in Section 3.2.2, within the Project limits, the Mall contains three distinct sections along its historic 12.5 blocks: symmetrically aligned center blocks flanked by two asymmetrically aligned ends. The historic design deliberately transitions through these areas with a beginning, middle, and end that divide the long linear facility into distinct rooms that correspond to the aesthetic of the adjacent buildings. The seven central symmetrical blocks align with the older, early-20th-century buildings set directly on the edge of the sidewalks without plazas or setbacks. This creates a central room consisting of a canyon of midrise early-20th-century structures bookended by plazas (Republic Plaza) and open spaces (Skyline Park) on either end. The late-20th-century, taller buildings are located along the plazas and open spaces in the smaller asymmetrical rooms flanking the larger, symmetrical central room.

As Project alternatives were developed and refined, it became clear that spaces along the Mall in both the symmetrical and asymmetrical blocks needed to be reallocated to meet the purpose and need (as described in Section 2.2). However, it also became clear that changing the spatial relationships influences essential design elements, including the intricate pattern (carpet) and alignment and relationship of trees and lights to the underlying pattern on individual blocks and along the length of the Mall. The Project Partners and designers spent countless hours refining the transit alignment alternatives presented in this section to honor the historic importance of the Mall’s design and meet the Project’s purpose and need to reallocate space for safety, mobility, and public use.
All the alternatives apply the same center-running transit cross-section to the current symmetrical center blocks (Figure 5-1) but differ in how they treat the current asymmetrical end blocks. The proposed changes to the symmetrical block sections common to all alternatives are described in Section 5.1.1.

The asymmetrical blocks were the focus of opportunity for minimizing overall harm to the historic 16th Street Mall property because the narrow 6-foot medians in the asymmetrical blocks potentially would require a less significant alteration to the design than is required to close the large medians in the symmetrical blocks. The symmetrical median blocks also have inherently more problems with the allocation of space because the separated transit-way lanes with a wider median create three undersized pedestrian and public use zones. The spatial arrangement of the existing wide sides of the asymmetrical blocks meets many of the spatial and urban design principles, so they at least partially meet some of the Project needs; however, the narrow sides of the blocks present challenges because of the narrowness and lack of amenities, trees, and lights.

Section 5.1.2 describes the how the asymmetrical block sections would be configured for each of the alternatives. Because the differences among the alternatives are only found in these asymmetrical end blocks (Figure 5-1), the analysis of the seven least harm factors (23 CFR § 774.3) is focused on the asymmetrical blocks and contained in Section 5.1.3.

5.1.1 Symmetrical Blocks (Existing Median)

There is no difference in the design for the symmetrical center blocks under the three alternatives. The changes to the cross-section design and pattern are described in this section but are not compared because they all have a common design and, therefore, result in the same harm according to the least harm factors.

5.1.1.1 Cross-section Design

The existing symmetrical blocks of the Mall extend seven blocks from Arapahoe Street to Tremont Place and include a center median with two rows of trees and public amenities separating the transit way and equally sized pedestrian zones on the north and south sides of the transit-way lanes.

Under all three transit alignment alternatives, the symmetrical blocks would be fully reconstructed and reconfigured to remove the center median space, implement a center-running transit section, and reallocate the median space to pedestrian walkways and comfortable public spaces on either side of the transit ways. Pedestrian walkways would be expanded from 8 to 10 feet, a new 9-foot amenity zone would be provided between the transit way and expanded pedestrian walkway, and the 9-foot patio/gathering spaces next to
the Mall’s facing buildings would be maintained. Existing granite pavers would be replaced with new granite pavers and, despite the substantial change in programming (use) of the spaces, the paver pattern would be largely maintained. Trees and historic replica light fixtures in the existing medians would be replaced and relocated to the new 9-foot amenity zones. The reconfiguration of space is shown on Figure 5-2. The reallocation of space improves the function of pedestrian, transit, and public spaces on these blocks.

5.1.1.2 Granite Paver Pattern
The existing design and pattern of the 80-foot-wide symmetrical blocks comprise five 16-foot-wide pattern sections, with the pattern size and colors becoming increasingly large and complex as the pattern moves from the buildings to the center median. A concrete apron of varying widths sits between the building faces and the edges of the granite pavers to accommodate variations in the locations of the building frontages. At the outside edges of the transit ways, a 2-foot-wide linear strip of vertical curb and pan separates the smaller diamond pattern of the pedestrian areas from the medium-sized diamond pattern of the transit ways. At the inside edges of the transit ways, another 2-foot-wide linear strip of pan separates the medium-sized diamond pattern of the transit ways from the large diamond pattern within the 22-foot-wide median space.

Due to the symmetry of the pattern, the LPA, LPA Design Option, and Center Running Alternatives can largely maintain the granite paver pattern of the Mall’s iconic pavement carpet despite the changes in uses of the spaces. Figure 5-3 illustrates the symmetrical block pavement pattern for the existing and proposed designs of the Mall’s center blocks (between Arapahoe Street and Tremont Place).
Figure 5-3. Existing and Proposed Symmetrical Block Design

Under the proposed center-running block design common to the LPA, LPA Design Option, and Center Running Alternative, the pattern would remain the same as the existing pattern for the symmetrical blocks in the center of the Mall. The size, material, colors, and pattern arrangement of the granite pavers would be retained, except for the removal of the 2-foot-wide linear strip of vertical curb and pan that currently sits at the outside edges of the transit ways (Figure 5-3). This linear strip would not be needed under the center-running transit design because the transit ways would move to the center of the Mall. The resulting change to the pattern would close the diamond at the edge of the (now) amenity zone and shift the outside small diamond pattern 2 feet toward the center of the Mall (Figure 5-3). The existing 2-foot-wide linear strip of pan on the inside edges of the transit ways would be retained and become the new edge of the center-running transit way. The alternating placement of trees and lights in two rows next to the transit ways would also be maintained but the location of the rows of trees and lights would be changed from the inside to the outside of the transit ways.

Although the paver pattern on the symmetrical blocks would be retained with the new center-running transit cross-section, changing the programming changes how the activities on the Mall correspond to the pattern. In the current design, the paving pattern of large diamonds defines the pedestrian promenade and a distinct pattern of medium diamonds defines the transit-way lanes. Under the center-running transit cross-section, the transit way would run on the larger diamonds, and the trees and amenities would be on the surface with the medium-sized diamond pattern. Pedestrians would continue to use pedestrian walkways defined by the
smaller diamond pattern. The Section 106 consulting parties determined maintaining the physical elements of the pavement design (rather than maintaining the programming relationships) was an important mitigation measure to minimize adverse effects to the historic design.

Changes to the pattern on the symmetrical and asymmetrical blocks could be required to accommodate current standards and requirements, such as the ADA and safety improvements at shuttle stops. However, the commitment to retain the pattern geometry, spatial relationships, massing, size, scale, and color of the pavement design elements unless these requirements necessitate changes has been included in the Programmatic Agreement as design commitments as the Project advances through final design and construction.

5.1.1.3 Trees and Lights
The same number and alignment of trees and lights would be provided in the proposed center-running cross-section. The tree species would change but new trees would be included based on the historic design criteria.

In the symmetrical median blocks, the original design provided for honey locust trees. City regulations and best practices regarding tree species have evolved since the original design, and the monoculture plantings of a single tree species is discouraged. The new plantings will select tree species according to the historic design criteria regarding height, diameter, branch and leaf structure, shade characteristics, and other tree health elements but will not incorporate a single tree species. The Programmatic Agreement includes a listing of tree candidates that meet these criteria from which the final species will be selected.

The existing light standards are replicas of the original design. These replica standards would be relocated and/or replicated as necessary.

5.1.1.4 Relationship of Center Room to Overall Design
With the LPA, the symmetrical blocks continue to reflect the core of older, turn-of-the-century historic buildings, bounded by the D&F tower (clock tower) at Arapahoe Street on the west end and (former) May D&F building and Zeckendorf Plaza at Tremont Place on the east end. The Project has committed through the Programmatic Agreement to a facade enhancement program to encourage property owners to restore historic characteristics of historic buildings along the Mall, further preserving the relationship of the Mall to its surroundings and historic setting.
5.1.2 Asymmetrical Blocks

The existing asymmetrical sections comprise a total of five-and-a-half blocks on the ends of the Mall, including three blocks from Market Street to Arapahoe Street on the west end of the Mall and two-and-a-half blocks from Tremont Place to Broadway on the east end, including the half-block Gateway Plaza. The asymmetrical blocks are separated by the symmetrical center section described in Section 5.1.1. The location of the transition between the center and end blocks is shown in plan view on Figure 5-1.

The Mall’s existing asymmetrical blocks are configured with transit-way lanes aligned next to each other, separated by a narrow median with custom light standards, a wider pedestrian zone and two rows of trees on the north side (or triangular-shaped plaza in the case of the half-block Gateway Plaza), and a narrower pedestrian zone without trees on the south side.

The existing and proposed configuration of spaces is illustrated in the cross-sections on Figure 5-4. A detailed description of the asymmetrical block designs under each of the alternatives follows.
5.1.2.1 Locally Preferred Alternative

The LPA new asymmetrical block design was developed to honor the Mall’s end blocks in an asymmetrical configuration (wider on the north side) and concept of the three rooms along the length of the Mall. The LPA would maintain the asymmetrical end rooms of the Mall in the same location and proportion as the historic design, with the same number of blocks in the same location of the progression among the beginning, middle, and end areas.

To meet the Project’s safety, mobility, and public use needs, the LPA would reconfigure the cross-section of the asymmetrical blocks to widen the pedestrian walkway and add a new amenity zone to the narrow (south) side of the blocks by removing the narrow median between the transit way and shifting the transit way 2 feet north.

The reconfiguration of space would also result in changes to the paver pattern. On the wide (north) side of the blocks—from the transit way to the building face apron—the granite pavement pattern would be shifted 2 feet north, effectively repositioning the black granite edge of the pattern under the apron, similar to picking up and moving a carpet. This shift would likely not be perceptible to the casual Mall user, but it means none of the pavers would be in exactly the same location as in the current design.

The existing bus mirror overhang at the edges of the transit way would be reduced by 1 foot, resulting in a net 1-foot loss in usable space outside the transit way on the wide side of the block. From the edge of the transit way south, the narrow 6-foot buffer between the transit-way lanes would be closed, and the light standards in the median would be relocated to a new amenity zone between the transit way and pedestrian walkway. The 7 feet of “gained” space—6 feet from between the transit-way lanes and net 1 foot from the shift north—would be reallocated on the narrow side of the block to provide a 10-foot-wide pedestrian walkway (adding 2 feet over the existing condition) and a new 5-foot-wide amenity zone with a row of trees and lights.

A double row of trees, 16 feet apart, would be maintained on the wide side of the block, and a row of lights would be added to the north row of trees to provide additional lighting (Figure 5-4). The spatial relationship of alternating trees and lights would be maintained, and the rows of trees would occupy the same place within the pattern (in the medium-sized, light-gray-colored diamonds).

The effects of these spatial shifts on the paver pattern is shown on Figure 5-5. The larger diamond patterns with the red granite pavers are retained (but shifted). The small black granite grid pattern on the south edge of the block would be increased on the south edge of the block and reduced on the north edge of the block. A “mending” of the pattern would occur where the median and light standards are removed; the linear strip of curb/pan on the inside edges of the transit way would be removed, and the diamond pattern would be closed (Figure 5-5).

The half-block Gateway Plaza between Cleveland Place and Broadway would be rebuilt in its current configuration, its missing trees would be replaced, and the fountain would be repaired. Other than changes that may be required to comply with ADA, this block would be fully restored to reflect the historic design.
5.1.2.2 LPA Design Option

The LPA Design Option was developed in response to a request by one of the Section 106 Consulting Parties to modify the LPA’s asymmetrical block design. The intent of the requested modification was to maintain more of the Mall’s historic design elements to potentially result in less harm to the historic resource. The requested modifications focused on rebuilding three-and-a-half of the original five-and-a-half asymmetrical blocks, from Market Street to Lawrence Street and from Court Place to Broadway, in place on the wide (north) side of those blocks, from the building faces to the outer (north) edge of the existing transit way. The LPA Design Option avoids the LPA’s 2-foot shift north in the pattern on the wide (north) side of these three blocks.

The LPA Design Option was developed by considering the specific building uses, plazas, and traffic characteristics of each of the asymmetrical blocks to consider whether there was opportunity to leave a portion of the Mall “as is” and meet the purpose and need for the Project. The LPA Design Option supposes that the existing building uses and spatial configurations of the east one-and-a-half blocks and west two blocks create a different context where the purpose and need could be met with a reduction in the space allocated for public use on the narrow sides of the blocks. Because the consulting party did not feel building uses and other characteristics of the blocks between Arapahoe Street and Lawrence Street on the

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**Legend**

- **Historic Replica Light Standard**
- **Granite Paver Unit - Diamond (colors vary)**
- **Granite Special Unit - Abutting Curbs/Drains (colors vary)**
- **Granite Special Unit - Transit Way Delineation (colors vary)**
west and Tremont Place and Court Place on the east had the same context and opportunities, the LPA Design Option would extend the center-running block design one block farther on each end rather than introduce additional transitions and multiple asymmetrical block configurations across the Mall. As a result, the LPA Design Option would maintain the concept of three rooms on the Mall but would change the location of the transitions between the symmetrical and asymmetrical blocks and change the sizes of the rooms by reducing the areas of the asymmetrical sections and increasing the size of the symmetrical section.

Under the LPA Design Option, the pavers on the wide sides of three-and-a-half blocks of the asymmetrical ends of the Mall would be rebuilt in their existing locations, eliminating the LPA’s 2-foot shift north and associated change to the paver pattern on a portion of these blocks. As with the LPA, the LPA Design Option would remove the lights and 6-foot buffer between the transit way and provide 5 feet of additional space for the narrow side of the block (6 feet less the 1-foot reduction in the bus mirror hazard), compared to the 7 feet provided by the LPA. For the narrow side of the asymmetrical blocks in the LPA Design Option, the pedestrian walkway would be expanded 2 feet, a 5-foot amenity zone with a row of trees\(^2\) would be added, and patio/gathering spaces would be reduced 2 feet, from 9 feet to 7 feet. Additionally, the new single row of new trees on the narrow side of the blocks would shift 2 feet south compared to the LPA and would not align with the center-running block trees at the transition points between the symmetrical and asymmetrical sections, so a single row of aligned trees would not be provided along the Mall.

For the two blocks converted to the symmetrical section, the transit way would move to the center (into the wide side of the block), the narrow median and light standards between the transit way would be removed, and space would be reallocated equally to the north and south sides of the section. The result would be a net gain of 8 feet on the narrow side and a net loss of 5 feet on the wide side, for an equal amount of space for pedestrian walkways, amenity zones, and patio/gathering space on each side of the transit way.

The LPA Design Option would rebuild the half-block Gateway Plaza between Cleveland Place and Broadway in its current configuration in the same way as the LPA.

Compared to the LPA, the LPA Design Option maintains more integrity of the paver pattern and location on a portion of three of five asymmetrical blocks. However, it has less continuity with the overall design along the Mall achieved by the LPA, which preserves the room sizes and transition locations and the alignment of trees along the length of the Mall.

\(^2\) CCD and RTD also considered a reduced amenity zone (3-foot) as an option to eliminate the 2-foot shift north in the LPA. However, the reduced amenity zone would not accommodate lights and trees. To meet the safety needs for delineating the pedestrian and transit spaces, additional features, such as bollards would be needed to physically delineate the pedestrian walkways and transit way on the narrow side of the block. The partners determined these features (or lack of features) compromised the design and introduced undesirable vertical elements that limited the permeability and flexibility of the Mall space and were counter to the Project’s purpose.
5.1.2.3 Center Running Alternative

The Center Running Alternative would align transit in the center of all the existing asymmetrical blocks, including the half-block Gateway Plaza, providing equal spaces on either side of the transit way for patio/gathering space, amenity zone, and pedestrian walkways. The transit way would be aligned in the center of each block, the 6-foot median between the transit-way lanes would be removed, and space reallocated equally to the north and south sides of the section. The result would be a net gain of 8 feet on the narrow side and a net loss of 5 feet on the wide side, for an equal amount of space for pedestrian walkways, amenity zones, and patio/gathering space on each side of the transit way throughout the Mall’s 12.5 blocks. Two rows of trees would be provided, one in each of the amenity zones. The Center Running Alternative provides a consistent design across the Mall’s 12.5 blocks and does not maintain the original design’s three-room concept with symmetrical and asymmetrical sections of differing paver patterns.
5.1.3 Least Harm Analysis of Transit Alignment Alternative Asymmetrical Block Designs

The following narrative describes the relative harm resulting from each of the alignment alternatives according to the seven factors outlined in 23 CFR § 774.3(c)(1). The analysis focuses on the designs for the end blocks, as the center blocks are treated the same way under each of the alignment alternatives, as described in Section 5.1.1.

**Factor (i): The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property)**

The 16th Street Mall is the only historic property requiring transportation use and is, therefore, the only property considered in this analysis. All the alternatives result in adverse effects to the 16th Street Mall property. Because the entire 16th Street Mall property is being rebuilt, the ability to mitigate adverse effects is related primarily to the ability of the new Mall design to retain elements of the historic design concept, materials, and configuration. Mitigation measures are, therefore, expressed through design commitments that maintain elements of the historic design and materials.

**LPA**

The LPA would maintain the Mall as a 12.5-block pedestrian and transit mall and retain important elements of the historic design and materials. Design elements that would be retained include the footprint, relationship to surrounding buildings, asymmetrical and symmetrical block designs provided along the same center and end blocks, and a row of aligned trees across the 16th Street Mall property. Materials that would be retained include granite pavers, signs, replica lights, and potentially representative elements of original street furniture and fountains. The paver pattern has been carefully redesigned to honor the historic design with the same grid, diamond patterns, and colors as the original design; the spatial relationships between the trees and lights and the pavement pattern have also been retained.

The LPA would fully reconstruct the half-block at the east end of the Mall (the triangular-shaped Gateway Plaza block from Cleveland Place to Broadway) in the historic configuration of pedestrian, transit, and plaza spaces. The space would be rebuilt with historic materials, including granite pavers, trees, and lights, in same locations.

These design commitments, included in the Programmatic Agreement, maintain the Mall’s historic integrity of materials and workmanship (granite pavers, light fixtures, signage), setting (length/area of rooms, physical and visual transition locations of the rooms, and row of trees), and location (pedestrian and transit mall along 16th Street).

**Ability to Mitigate the Changes to Pattern**

The LPA would be implemented with granite pavers arranged to mimic the Mall’s existing three colors, diagonal grid, and diamond patterns. The pavement pattern would retain the original I.M. Pei-designed 45-degree diagonal grid and the small, medium, and large diamond patterns. The design concept of a carpet covering the space between the existing buildings on an intimate scale would be retained and is referential of the original design with smaller, darker pavers near the buildings and larger and more intensely colored pavers toward the center. The paver pattern maintains the same spatial relationships of trees and lights within the pattern.
The LPA design would shift the paving pattern on the wide side of the asymmetrical blocks 2 feet north, reducing the black pattern edge near the buildings on the north side of these blocks (Figure 5-5).

From the transit way south, the 6-foot area between the transit-way lanes would be closed, and the pattern would be “mended” to change the special pavers delineating the transit way to medium-sized diamonds. The rest of the diamond pattern would remain and shift north (Figure 5-5).

**Ability to Mitigate the Changes to Lights and Trees**
The LPA maintains the double row of trees and lights on the wide side of the block as with the original design. The tree species would change, as the original design included red oak trees for the asymmetrical blocks, most of which have not survived. As with the symmetrical block design, the monoculture of tree species is not recommended, and new species would be selected based on the historic design criteria and candidate species for the asymmetrical blocks defined and included in the Programmatic Agreement.

The design concept of two rows of trees on the wide side of the block would be retained but the rows would shift 2 feet closer to the buildings as a result of the shift of the carpet north. The spatial relationship of the trees to the pattern would be retained.

A new row of trees would be added in the new amenity zone on the narrow side of the block. In the original design, the narrow pedestrian areas on the asymmetrical blocks did not have trees, but the designers felt that these pedestrian areas could be landscaped to “augment the mall greenery without diminishing street vistas” (I.M. Pei & Partners, 1977). The new row of trees would align with the trees in the center symmetrical section, maintaining the design concept of a row of trees aligned across the entire length of the Mall.

The LPA also adds lights to the both sides of the asymmetrical blocks, lined up with the new row of trees on the narrow side and with the second row of trees on the north side, in the same alternating pattern as the existing trees and lights next to the transit way. The lights would be the same replica lights that are currently on these blocks. The spatial relationship of the trees and lights within the pattern would be retained.

**Ability to Mitigate the Changes to the Relationship of the End Rooms to the Overall Design**
The LPA maintains the historic design’s three rooms with the same transition locations and dimensions. The length and area of the center symmetrical room and end rooms remain the same. Because the rooms remain the same, the integrity of the setting and the relationships of the Mall to the adjacent buildings and uses are also preserved.

From these points, the important viewsheds of the capital and clock tower are maintained as with the original design.

The visual and architectural transitions to the asymmetrical section of urban renewal/modernist development continue to be reflected by the modernist plazas of Skyline Park on the west end and Republic Plaza on the east end.

**LPA Design Option**
The LPA Design Option would maintain the Mall as a 12.5-block pedestrian and transit mall and retain important elements of the historic design and materials. Compared to the LPA, the LPA Design Option retains less of the overall design concept because it changes the Mall’s location
of asymmetrical and symmetrical blocks and associated setting/relationship to surrounding buildings, and does not provide a row of aligned trees across the 16th Street Mall property.

Like the LPA, the LPA Design Option would retain granite pavers, signs, replica lights, and potentially representative elements of original street furniture and fountains. Throughout, the LPA Design Option would implement the same grid, diamond patterns, and colors as the original design and retain the spatial relationships between the trees and lights and the pavement pattern. For three blocks, the LPA would better replicate the paver pattern on the wide side of these blocks by not only retaining the paver pattern but by avoiding the 2-foot shift north. The reconstruction of the pavers in the same location as the original design minimizes the alteration of this aspect of the design.

Like the LPA, the LPA Design Option would fully reconstruct the half-block at the east end of the Mall (the triangular-shaped Gateway Plaza half-block from Cleveland Place to Broadway) in the historic configuration of pedestrian, transit, and plaza spaces. The space would be rebuilt with historic materials, including granite pavers, trees, and lights, in same locations.

**Ability to Mitigate the Changes to Pattern**

The LPA Design Option would have similar commitments to the LPA regarding the use of granite pavers arranged to mimic the Mall’s existing three colors, diagonal grid, and diamond patterns as a carpet between buildings. The paver pattern would maintain the same spatial relationships of trees and lights within the pattern.

For the five-and-a-half asymmetrical blocks, the LPA Design Option would:

- Change the pattern to the symmetrical pattern of the center-running cross-section for two blocks
- Maintain a portion of the pavement pattern along the wide side of three blocks
- Fully reconstruct a half-block with the existing pattern

The LPA Design Option would maintain the paving pattern on the wide side of three asymmetrical blocks, holding the edge of the transit way alignment on the north side in the same location, allowing the pavers to be rebuilt in the same location (**Figure 5-6**).

Like the LPA, from the transit way south, the 6-foot area between the transit-way lanes would be closed, and the pattern would be “mended” to change the special pavers delineating the transit way to medium-sized diamonds. The rest of the diamond pattern would remain and shift north (**Figure 5-6**). The trees and lights would maintain the same relationship with the pattern but, compared with the LPA, would be located 2 feet farther south (because the LPA Design Option avoids the shift of the transit way north). For this reason, the trees in the LPA Design Option asymmetrical blocks would not align with the trees along the center sections, and a single row of aligned trees on the Mall would not be retained.

**Ability to Mitigate the Changes to Lights and Trees**

The LPA Design Option maintains the double row of trees and row of alternating lights and trees on the wide side of the block in the same locations as with the original design. The trees would be replaced, and the species would change, as the original design included red oak trees for the asymmetrical blocks, most of which have not survived. As with the LPA, the new species would be selected based on the historic design criteria and candidate species for the asymmetrical blocks defined and included in the Programmatic Agreement.
Under the LPA Design Option, a new row of trees would be added in the new amenity zone on the narrow side of the block. In the original design, the narrow pedestrian walkway on the asymmetrical blocks did not have trees, but the designers felt that this walkway could be landscaped to “augment the mall greenery without diminishing street vistas” (I.M. Pei & Partners, 1977). The new row of trees in the LPA Design Option would be located 2 feet farther south compared to the LPA and would not align with the trees in the center symmetrical section, and the concept of maintaining the design concept with a row of trees aligned across the entire length of the Mall would not be possible.

The LPA Design Option also adds lights to the new row of trees and to the second row of trees on the north in the same alternating pattern as the existing trees and lights next to the transit way. The lights would be the same replica lights that are currently on these blocks. The spatial relationship of the trees and lights within the pattern would be retained.

Ability to Mitigate the Changes to the Relationship of the End Rooms to the Overall Design
The LPA Design Option maintains asymmetrical end blocks and honors the three-room concept but changes the transition locations between the symmetrical and asymmetrical blocks and changes the room dimensions. The LPA Design Option extends the center symmetrical room section two blocks, creating a nine-block center room and reduced-sized end rooms of one-and-a-half and two block rooms. The change in the transition locations also affects the integrity of the setting for the relationships of the Mall to the adjacent buildings and uses.

The change in the transitions also affects the setting through changes the visual and architectural transitions between older and mid-century and later modern developments.

Center Running Alternative
The Center Running Alternative implements the same symmetrical cross-section across the Mall. For the asymmetrical blocks, this results in an entirely new design and cross-section that does not reflect or reference the historic design.

Factor (ii): The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection

LPA
The LPA would result in an adverse effect to the 16th Street Mall. It would alter characteristics of the property that qualify it for Section 4(f) protection. Through mitigation commitments, historic features would be retained, such as granite paver material, portions of the granite paver pattern, lights, and trees, that would continue to convey historic significance. Aspects of the overall design concept would also be retained, such as the asymmetrical ends separated by a symmetrical center section and the alignment of a row of trees across the Mall to unify the differing cross-sections of the center and end rooms.

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3 As noted previously, CCD and RTD also considered a reduced amenity zone (3-foot) as an option to eliminate the 2-foot shift north on the wide side of the block. However, the reduced amenity zone would not accommodate lights and trees. To meet the safety needs for delineating the pedestrian and transit spaces, additional features, such as bollards would be needed to physically delineate the pedestrian walkways and transit way on the narrow side of the block. The Project Partners determined these features (or lack of features) compromised the design and introduced undesirable vertical elements that limited the permeability and flexibility of the Mall space and were counter to the Project’s purpose.
Character-defining features that would be significantly altered or replaced include the subsurface drainage system, utilities, and tree boxes; removal of median spaces; and alignment of the transit way. These features directly contribute to the Mall’s deficiencies and must be replaced.

Although final decisions have not been made, it is likely that most existing street furnishings will be removed and replaced; there may be opportunity to preserve examples of these features as a measure to minimize harm. The Programmatic Agreement provides for ongoing consultation for these unknown elements as the design progresses.

Specific to the asymmetrical end sections or rooms, the LPA would reconfigure five of the five-and-a-half asymmetrical blocks by closing the narrow median space and lights between the transit way and shifting the transit way two feet toward the wide side of the block. In this area, the pattern would be replicated but shifted two feet north, and the last two feet of the edge of the pattern would be lost, as if the carpet were tucked under the building aprons. Between the edge of the transit way on the north, the pattern would be “mended” to accommodate the removal of the area between the transit-way lanes and the reallocation of space to provide a wider pedestrian walkway and new amenity zone on the narrow side.

A row of trees and lights would be added to the narrow (south) side of the blocks, and these trees would align with the row of trees on the south side in the center-running blocks.

The spatial configuration and granite pattern on the half-block at the east end of the Mall (Cleveland Place to Broadway) would be retained.

**LPA Design Option**

The LPA design option would result in an adverse effect to the 16th Street Mall. It would alter characteristics of the property that qualify it for Section 4(f) protection. Through mitigation commitments, historic features would be retained, such as granite paver material, portions of the granite paver pattern, lights, and trees, that would continue to convey historic significance. As with the LPA, decisions on existing street furnishings would be considered in final design.

The LPA Design Option maintains aspects of the overall design concept’s asymmetrical and symmetrical sections but changes the location and sizes of those areas. The LPA Design Option provides the same number of trees as the LPA and retains the spatial relationship between trees and lights within the pavement pattern but the alignment of trees across the Mall would be offset by two feet between the symmetrical center and asymmetrical end sections.

Specific to the asymmetrical end sections or rooms, the LPA Design Option would retain the half-block at the east end of the Mall in its current configuration, like the LPA. For the remaining five blocks, the LPA Design Option would apply two cross-sections. Two blocks would be converted to the center-running section, extending the center room from 7 to 9 blocks. Three blocks would be reconfigured to maintain the pattern and location of granite pavers on the wide (north) side. For these three blocks, the transit way and narrow side of the block would be reconfigured to remove the narrow space between the transit way, and the pattern would be “mended” to accommodate the removal of the area between the transit-way lanes and its reallocation to a wider pedestrian walkway and an amenity zone on the narrow side. A row of trees and lights would be added to the narrow (south) side of the blocks; the trees would not align with the row of trees in the center-running blocks as with the LPA. Next to the
amenity zone, a wider pedestrian walkway would be provided, and the patio/gathering spaces would be reduced from 9 to 7 feet.

**Center Running Alternative**

The Center Running Alternative would result in an adverse effect to the 16th Street Mall property that would be more severe than the LPA or LPA Design Option because the original design element of having three distinct zones (beginning, middle, and end rooms of symmetrical and asymmetrical blocks) would not be retained.

**Factor (iii): The relative significance of each Section 4(f) property**

Significant Section 4(f) properties in the study area include the 16th Street Mall, historic buildings and districts of buildings facing the Mall, and Skyline Park, a recreational Section 4(f) property.

The LPA, LPA Design Option, and Center Running Alternative all affect the 16th Street Mall property, and none would affect Skyline Park. None of the alternatives directly affect the other historic properties or districts of buildings facing the Mall or result in a substantial impairment that would result in a constructive use of these buildings or districts. However, because the LPA maintains the same overall design concept and locations of the asymmetrical and symmetrical rooms, it best maintains the relationship of the Mall to the facing historic buildings.

**Factor (iv): The views of the officials with jurisdiction over each Section 4(f) property**

The SHPO and Advisory Council on Historic Preservation, who is participating in the resolution of adverse effects, are officials with jurisdiction under Section 4(f). The Section 4(f) Evaluation will be provided for official review and comment, but to date neither has reviewed or provided official views of the Section 4(f) alternatives, analysis, or findings. Therefore, there is no difference among the alternatives relative to Factor (iv).

**Factor (v): The degree to which each alternative meets the purpose and need for the project**

The purpose of the Project is to develop and implement a flexible and sustainable design for the Mall to address deteriorating infrastructure, provide equitable and sufficient space for high-quality public gathering opportunities, improve pedestrian and vehicle safety, and continue reliable two-way transit shuttle bus service (the Free MallRide) on the Mall while honoring the Mall’s use and iconic design.

The LPA, LPA Design Option, and Center Running Alternative meet the needs to address deteriorating infrastructure and improve pedestrian and vehicle safety and mobility to the same degree, as described in this text. The three alternatives differ in the degree to which they meet the need to provide equitable and sufficient space for high-quality public gathering opportunities.

**Degree to which the alternatives meet the need to address deteriorating infrastructure**

All three alternatives rebuild failing and outdated infrastructure; minimize maintenance costs and transit operations disruptions related to repair of failing pavement; and provide adequate space and irrigation for healthy trees.

**Degree to which the alternatives meet the need to improve pedestrian and vehicle safety**

All three alternatives provide safe delineation between the pedestrian walkway and transit way with amenity zones, reducing the potential for incidents, particularly on the symmetrical blocks.
where the current rate is highest. All three alternatives reduce the potential for pedestrian slips and falls and improve bus traction through a new higher-friction pavement surface.

**Degree to which the alternatives meet the need to improve pedestrian and vehicle mobility**

All three alternatives provide adequate pedestrian walkway space to safely accommodate high pedestrian volumes. All three alternatives continue to provide two-way Free MallRide service.

**Degree to which the LPA meets the need to provide equitable and sufficient space for high-quality public gathering opportunities**

**LPA**

The LPA meets this need better than the LPA Design Option and not as well as the Center Running Alternative. The LPA reallocates space to widen pedestrian walkways to accommodate high pedestrian volumes, provide new amenity zones, and maintain patio/gathering space for public gathering and activation. Patio spaces have been shown to be the most important factor to activating and maintaining public use and enjoyment. The LPA provides trees and lights on both sides of the asymmetrical blocks to improve public enjoyment and use of the patio/gathering space and amenity zone, however, the wide side of the asymmetrical block has more public space than the narrow side.

**LPA Design Option**

The LPA Design Option meets this need to a lesser degree than the LPA and the Center Running Alternative. The LPA Design Option reallocates space to widen pedestrian walkways to accommodate high pedestrian volumes, provide new amenity zones, and maintain patio/gathering space for public gathering and activation on the center-running blocks, which comprise 9 of the 12 blocks of the Mall under the LPA Design Option. On the asymmetrical blocks, which comprise 3.5 of the 12 blocks of the Mall under the LPA Design Option, the LPA Design Option would not meet the need for equitable and sufficient space for high-quality public gathering opportunities as well as the LPA or Center Running Alternative. The LPA Design Option provides trees and lights on both sides of asymmetrical blocks to improve public enjoyment and use of patio/gathering space and amenity zone. However, the patio space would be reduced from both existing and proposed LPA conditions by 2 feet on the narrow side of the block. Reducing the patio space by 2 feet reduces the seating capacity by one-third, resulting in less public activation; patio space has been demonstrated to be the most activating space for public use. This design maintains an inequity in the public use of the asymmetrical blocks, with the narrow side continuing to have less capacity for public use and be less desirable.

The reduced patio/gathering space was proposed for three-and-a-half of the existing five-and-a-half asymmetrical blocks because the consulting party felt the plazas and building uses on adjacent properties create a different context on these blocks. Although some of the current building uses on those blocks may not benefit from patio space, the Mall is being designed to provide a flexible public space that can accommodate and respond to changes in building and land use over the next 30 to 50 years. Additionally, on one of the two blocks with adjacent privately-owned plaza space, the plaza space is on the wide side of the block, which does not benefit use of the narrow side.
Center Running Alternative
The Center Running Alternative meets this need to a greater degree than the LPA and the LPA Design Option. The Center Running Alternative reallocates space to widen pedestrian walkways to accommodate high pedestrian volumes, provide new amenity zones, and maintain patio/gathering space for public gathering and activation. Patio spaces have been shown to be the most important factor to activating and maintaining public use and enjoyment. The Center Running Alternative would eliminate all asymmetrical blocks, thus providing the same amount of space for public enjoyment and use of the patio/gathering space and amenity zone on both sides of every block on the Mall, rather than maintaining a condition where one side of the block has more space for public use than the other.

Factor (vi): After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f)

LPA
Economic conditions
The LPA maintains the width of patio/gathering spaces for the length of the Mall and enhances use of those spaces on the narrow sides of the asymmetrical blocks by adding an amenity zone with trees and lights to the narrow side. The enhanced public use on the narrow side of the asymmetrical blocks more equally distributes the benefits of public use to adjacent businesses and property owners than existing conditions. This would provide a more desirable public space for owners and tenants on the narrow side of the block and more long-term flexibility to support changes in businesses and building uses over time.

The LPA improvements to transit and pedestrian mobility, infrastructure, safety and security, and greater public use result in long-term, direct, positive impacts to business revenues adjoining the Mall and corresponding increased sales tax revenues.

Visual and aesthetic resources
Existing and historic views are unchanged, and a row of aligned trees is maintained along the length of the Mall.

Public safety and security
Greater activation of patio/gathering spaces and amenity zones improves natural surveillance and discourages crime.

Transit operations
Lane shift between symmetrical (center-running) and asymmetrical blocks of 4 feet lessens the turning movements bus drivers must make at transitions when compared to existing and proposed LPA Design Option conditions but is not as good as the Center Running Alternative, which requires no lane shift.

LPA Design Option
Economic conditions
The reduced 7-foot patio/gathering space width (versus 9 feet in existing and proposed LPA and Center Running Alternative conditions) on the narrow side of the asymmetrical blocks removes 30 percent of outdoor table seating (which has been demonstrated to be the most activating space for public use). This condition reduces public activation on the narrow side of the blocks, resulting in a less desirable business location than the wide side of the blocks and greater impacts to those property owners and businesses.
Sales tax revenue would be less for the LPA Design Option than the LPA and Center Running Alternative because patio spaces on the asymmetrical blocks would be reduced; the loss of sales tax revenue would have a direct effect on the revenues the BID collects to maintain downtown infrastructure, including the Mall.

Visual and aesthetic resources
Views to the May D&F tower and the capital building are changed as a result of the change in location of the transitions between the symmetrical and asymmetrical blocks. The row of trees on the narrow side of the asymmetrical blocks does not align with the row of trees on the south side of the symmetrical blocks.

Public safety and security
Greater activation of patio/gathering spaces and amenity zones improves natural surveillance and discourages crime. Reducing patio/gathering space on three asymmetrical blocks reduces the primary generator of public activity on those blocks by one-third, resulting in a small reduction of natural surveillance activity on these blocks compared to the LPA and Center Running Alternative.

Transit operations
Lane shift between symmetrical (center-running) and asymmetrical blocks of 6 feet lessens turning movements bus drivers must make at transitions when compared to existing conditions and increases the turning movements when compared to the 4-foot shift of the LPA and the lack of shift in the Center Running Alternative.

Center Running Alternative
Economic conditions
The Center Running Alternative equitably allocates space for businesses by creating a symmetrical design with the same size patio/gathering area, pedestrian walkway, and amenity zone on both sides of the block for the length of the Mall. This condition equally distributes the benefits of public use to adjacent businesses and property owners, providing desirable public space for owners and tenants and long-term flexibility to support changes in businesses and building uses over time.

The Center Running Alternative improvements to transit and pedestrian mobility, infrastructure, safety and security, and greater public use result in long-term, direct, positive impacts to business revenues adjoining the Mall and corresponding increased sales tax revenues.

Visual and aesthetic resources
Views to the May D&F tower and the capital building are changed as a result of the change of the entire Mall to a symmetrical block design. While the Center Running Alternative provides aligned trees along the length of the Mall, the unifying design concept the trees provide between the symmetrical and asymmetrical sections is no longer represented because the design no longer has varying cross-sections.
Public safety and security
Greater activation of patio/gathering spaces and amenity zones improves natural surveillance and discourages crime.

Transit operations
The Center Running Alternative eliminates the shift between symmetrical and asymmetrical blocks, eliminating the need for buses to shift in the transit-way lanes at transition points.

Factor (vii): Substantial differences in costs among the alternatives
All three alternatives cost approximately the same amount. The Center Running Alternative has the fewest trees, and the LPA has the most trees, but the cost for trees is a negligible amount of the overall Project cost.

Summary
Based on the analysis presented, the LPA appears to be the transit alignment alternative that results in least overall harm to the 16th Street Mall historic property. FTA will make a final determination after hearing from the officials with jurisdiction.

Table 5-1 summarizes the key differences among the LPA, LPA Design Option, and Center Running Alternative asymmetrical cross-section designs for each of the least harm factors.

Table 5-1. Comparison of Least Harm Factors (Differences Among Alternatives Only)

<table>
<thead>
<tr>
<th>Factor</th>
<th>LPA</th>
<th>LPA Design Option</th>
<th>Center Running Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Ability to mitigate adverse impacts</td>
<td>Retains wide side pavement pattern on asymmetrical blocks, but with a 2-foot shift north</td>
<td>Retains wide side pattern on three asymmetrical blocks in same location as existing condition</td>
<td>No mitigation of change in design of asymmetrical blocks to a symmetrical configuration</td>
</tr>
<tr>
<td></td>
<td>Retains location and size of asymmetrical and symmetrical rooms on Mall</td>
<td>Retains fewer of the existing asymmetrical blocks in an asymmetrical configuration</td>
<td>Retains aligned row of trees across the Mall</td>
</tr>
<tr>
<td></td>
<td>Retains aligned row of trees across the Mall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ii) Relative severity of remaining harm</td>
<td>Shifts pavement pattern on wide side of asymmetrical blocks north by 2 feet</td>
<td>Converts two asymmetrical blocks to symmetrical configuration and changes location of transitions between symmetrical and asymmetrical rooms</td>
<td>Does not retain design concept of asymmetrical and symmetrical rooms on Mall: converts all asymmetrical blocks to symmetrical configuration</td>
</tr>
<tr>
<td>(iii) Significance of each</td>
<td>Affects the 16th Street Mall property only</td>
<td>Affects the 16th Street Mall property only</td>
<td>Affects the 16th Street Mall property only</td>
</tr>
<tr>
<td>Factor</td>
<td>LPA</td>
<td>LPA Design Option</td>
<td>Center Running Alternative</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>------------------------------------------</td>
<td>--------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>Section 4(f) property</td>
<td></td>
<td>--------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>(iv) View of officials with jurisdiction</td>
<td>To be determined</td>
<td>To be determined</td>
<td>To be determined</td>
</tr>
<tr>
<td>(v) Purpose and need</td>
<td>Retains 9-foot patio/gathering space on both sides of asymmetrical blocks, but does not provide equal amounts of public space on both sides of asymmetrical blocks because amenity zone is smaller on narrow side</td>
<td>Reduces patio/gathering space to 7 feet on narrow side of three asymmetrical blocks, reducing public space and creating more inequity in public use between wide and narrow sides of these blocks Provides 9-foot patio spaces on two blocks converted to center running cross-section</td>
<td>Retains 9-foot patio/gathering space and provides equal amount of public space on both sides of all blocks</td>
</tr>
<tr>
<td>(vi) Impacts to resources not protected by Section 4(f)</td>
<td>Improvements to transit and pedestrian mobility, infrastructure, safety and security, and greater public use result in long-term, direct, positive impacts to business revenues adjoining the Mall and corresponding increased sales tax revenues Existing and historic views are unchanged</td>
<td>Sales tax revenue would be less than the LPA and Center Running Alternative on the three retained asymmetrical blocks because patio capacity on the asymmetrical blocks would be reduced by 30 percent Same benefit to business and sales tax revenue on the converted blocks as LPA and Center Running Alternative Views to the May D&amp;F tower and the capital building are changed as a result of the change in location of the transitions between the symmetrical and asymmetrical blocks</td>
<td>Improvements to transit and pedestrian mobility, infrastructure, safety and security, and greater public use result in long-term, direct, positive impacts to business revenues adjoining the Mall and corresponding increased sales tax revenues Views to the May D&amp;F tower and the capital building are changed as a result of the change of the entire Mall to a symmetrical block design</td>
</tr>
<tr>
<td>(vii) Costs</td>
<td>Negligible difference in cost among alternatives</td>
<td>Negligible difference in cost among alternatives</td>
<td>Negligible difference in cost among alternatives</td>
</tr>
</tbody>
</table>
The LPA and Center Running Alternative maintain 9-foot patio spaces and provide for greater public use than the LPA Design Option because they maintain the existing 9-foot patio/gathering space along the length of the Mall; patio and café space has been shown to best activate public spaces. While current building uses along the three redesigned asymmetrical blocks in the LPA Option may exhibit a different context that would not benefit as much from patio spaces, two businesses on the narrow sides of these blocks have current patio spaces that would be affected by the LPA Design Option. More importantly, though, the Mall is being designed to provide a flexible public space that can accommodate and respond to changes in building and land use over the next 30 to 50 years, and it is expected that the reactivation of public space under the LPA will spur changes to land uses to favor public use. The reduction in patio/gathering space of the LPA Design Option also results in an economic impact to businesses and loss of tax revenue for the BID, and reduced public use also negatively impacts perceptions of public safety and security. Additionally, the LPA Design Option results in greater visual impacts than the LPA due to the change in transition locations, which correspond to visual landscape units, and the inability to provide an aligned row of trees.

All of the alternatives result in adverse effects to the historic 16th Street Mall property, and all include mitigation measures to minimize those effects. The Center Running Alternative fundamentally changes the design of the Mall, and that cannot be mitigated, even though the alternative would maintain some design elements, such as the pavers, lights, concepts of aligned trees, and pattern within the symmetrical blocks. The LPA and LPA Design Options both maintain more elements of the original design concept and appear to result in less harm than the Center Running Alternative for factors (i) and (ii). Comparing the ability to mitigate harm and the severity of the remaining harm between the LPA and the LPA Design Option, the alternatives appear to be similar in their harm. The LPA maintains more of the overall design concept by preserving the same size and relationship of the asymmetrical and symmetrical rooms and an alignment of trees across the whole 16th Street Mall property. The LPA Design Option maintains a greater portion of the paver design and location on the three asymmetrical blocks where the alternatives differ but at the expense of the continuity of the overall design that the LPA provides.

5.2 Curb Options

Three transit way curb options were considered for the alternatives: a vertical curb, a pan, and a hybrid curb design with vertical curbs at shuttle stops, cross streets, and street intersections, and a pan in other locations. The curb options would all maintain the paver pattern, materials, and colors. Textural elements would be added to improve the visual delineation of the transit way from the amenity zone. The curb options could apply to any alignment alternative and do not affect the least harm conclusions for the transit alignment alternatives discussed in Section 5.1.3.

The vertical curb, illustrated conceptually on Figure 5-7, would be 4 to 6 inches tall. The pan, illustrated conceptually on Figure 5-8, would slope from the edges to the flowline in the center; the flowline would appear as a shallow longitudinal channel within the pan to direct water as part of the drainage system. In the hybrid curb option, the vertical curb would be constructed at shuttle stops, cross streets, and street intersections, and a pan would be constructed along the transit way in other locations, unless drainage design or ADA compliance requires additional curbs.
The Mall presents a unique curb condition. Both vertical curb and pan conditions currently exist on the Mall (Figure 5-9). Both the existing 4-inch vertical curb and the existing pan are built from the same materials and colors as the surrounding granite pavers, and the curb treatments are meant to fit within the pattern that covers the entire Mall, including the transit way, curb, and pedestrian areas. Because of the visual continuity of the pavement pattern, which was an intentional and character-defining detail of the Mall’s historic design, the curb is not sufficient alone to delineate the pedestrian space from the transit way to meet safety, mobility, and accessibility needs, including for people with disabilities.

The Mall was designed to mimic a Navajo rug and also resembles a diamondback rattlesnake, and the curbs were designed purposefully to minimize interruption of the pattern, including the color and verticality of the curbs. The National Institute of Building Sciences has developed Design Guidelines for the Visual Environment (2015), which indicate that curbs need both color and texture for delineation. The guidelines state that, “Walkways must not present hazards of tripping and falling due to uneven surfaces or from steps, curbs, and edging that are not clearly visible with change of color, value, and texture. Curbs and other walkway edges should be raised above the walkway pavement a minimum of 100 mm (4 in.) and be of contrasting color or value sufficient to be clearly visible to the pedestrian as a pavement boundary.”

The Mall is being redesigned to address the Project purpose and need for infrastructure, safety, mobility, and public use improvements. The new design seeks to replicate the original design to the greatest degree possible to minimize effects to the historic property, including the Mall’s
character-defining rug-like pavement design. This pavement design does not clearly delineate the pedestrian spaces with changes of color, value or texture; other edge delineation elements are needed. An effective level of visual contrast cannot be achieved with the existing colors in the pattern and providing a more prominent delineation that interrupts the pattern of the pavers represents a substantial impact to the Mall’s historic design. The consulting parties have given input that the pattern and materials of the pavers are among the most important features of the Mall’s historic design, and that the curb treatment is significant in relationship to the pattern and not for its vertical characteristic. To maintain the pattern and provide safe and ADA-compliant edge delineation along pedestrian spaces, the Project includes a suite of other elements to provide appropriate edge delineation and maintain the visual continuity of the historic design.

5.2.1 Common Elements Among the Curb Options

The design of all curb options would include common elements to comply with ADA, safety and accessibility guidance, and meet the Project safety, mobility, and public use needs defined in Section 2.2. These elements are illustrated for each option on Figure 5-10, Figure 5-11, and Figure 5-12. The following elements would be refined as the design evolves and outreach with the ADA/Disability Advisory Committee occurs per 49 CFR 37.137 (c) and FTA’s American’s With Disabilities Act Guidance (2015):

- The vertical curb, pan, or a combination of vertical and pan units (the hybrid curb option) would be constructed of the same granite material as the adjacent pavers, in colors that match the existing pattern.

- The design of each curb option would provide textured delineation at the back of the vertical curb or pan unit to assist visually impaired users in detecting the edge of the transit way. This texture is needed to meet the Project’s safety need factor because the vertical curb units purposefully blend in with the surrounding pattern and do not create a distinct visual “edge” between the amenity zone and transit way due to their substandard height (existing curb is 4 inches, a standard curb is 6 inches), low color contrast, and unified granite material that do not provide effective visual contrast. Introducing a strip that provides adequate visual contrast would disrupt the existing pattern and further impact the historic property. Providing textural strips improves the edge delineation.

- Truncated domes (textured indicator strips) would be installed at designated transit way and roadway crossings to comply with CCD and ADA standards. Although pedestrians can cross the transit way at any point along the Mall, the designated crossings occur at cross streets and at the ends of each block. They would be constructed of a different material than the granite pavers, their color would comply with ADA standards, and they would not adhere to the proposed pattern of the Mall. Outreach with the ADA/Disability Advisory Committee during a subsequent design phase will determine what the material and contrast will be for the truncated domes.

- Truncated domes would also be considered at designated shuttle stops to direct people to stand at an appropriate distance from the transit way and arriving shuttles. Truncated domes are not an RTD requirement at shuttle stops. These strips are required by ADA when there is no curb, and the Transit Cooperative Research Program (2008) recommends tactile strips (truncated domes) when there is a vertical curb, to increase pedestrian and transit
passenger safety by reducing the potential for collisions between pedestrians and shuttles at shuttle stops. If truncated domes are installed, they would be constructed of a different material than the granite pavers, their color would comply with ADA standards, and they would not adhere to the proposed pattern of the Mall. Outreach with the ADA/Disability Advisory Committee during a subsequent design phase would determine the material and contrast for the truncated domes if they are installed.

- Textural directional indicators would be installed within the 10-foot pedestrian walkways to guide visually impaired persons within the walkway and connect them with designated transit way or roadway crossings and transit stops. The indicators are not required for ADA compliance but would be installed to increase pedestrian mobility and safety, specifically to aid visually impaired users. Outreach with the ADA/Disability Advisory Committee during a subsequent design phase will determine what the material and contrast will be for this feature.

- An amenity zone with fixed furnishings such as seating, signage, and planters would be included to meet the Project safety, mobility, and public use needs. Current national guidance and RTD standards recommend visually and physically separating walkways from transit lanes to minimize instances of pedestrians inadvertently walking into transit lanes. The FHWA Pedestrian Safety Guide and Countermeasure Selection System (2013) recommends a buffer zone between 4 and 6 feet wide to separate pedestrians from the street, noting that street furniture or an amenity zone is typically appropriate in downtown or commercial areas (FHWA, 2013). NACTO recommends an amenity zone with street furniture (such as benches, greeneries, bollards, street lights, and bicycle parking) be used to delineate between the two areas (NACTO, 2013 and 2016). RTD Bus Infrastructure Design Guidelines and Criteria require that pedestrian/transit conflicts be eliminated, or minimized, by separating pedestrian pathways from active bus lanes (RTD, 2016a). Fixed furnishings would also protect the amenity zone, pedestrian walkway, and patio/gathering areas against errant vehicles. In their 2007 Site and Urban Design for Security Guidance, Federal Emergency Management Agency does not list curbs as and does list sculptural or seating barriers, hardened street furniture, light standards, and trees barrier elements. The placement and form of the fixed furnishings will be evaluated during subsequent design phases and subject to Section 106 consultation.

- A transit lane indicator between transit-way lanes would be applied in the transit way to aid shuttle operators by clearly defining the inside edge of the transit-way lanes. The transit lane indicator technique is undecided. Possible techniques include but are not limited to textured pavement, reflective surface treatments and other emerging technologies, with the intent of minimizing visual changes to the pavement pattern. The transit lane indicator will be addressed during consultation under Section 106 in a subsequent design phase.
Figure 5-10. Vertical Curb Option

Figure 5-11. Pan Option
5.2.2 Least Harm Analysis of Curb Options

The following narrative describes the relative harm resulting from each of the curb options according to the seven factors outlined in 23 CFR § 774.3(c)(1). Further information about the curbs is available in the Alternatives Analysis technical memorandum included in Appendix B.

**Factor (i): The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property)**

This is not a distinguishing factor in determining least overall harm among the curb options. Each of the alternatives would move the curb units from their existing locations, causing an adverse effect to the 16th Street Mall property. All of the curb options include the same commitments to continue the material and pattern of the design and to continue to evaluate types and placement of delineation elements that minimize visual impacts to the Mall’s pattern and materials. All options would retain a 2-foot linear pattern at the edge of the transit way, mimicking the existing pattern. Although the vertical curbs would be relocated to the edge of the new transit way, in the center-running blocks, the curb treatment would follow the same line as the current pan between the transit ways and the median.

Common elements required for ADA compliance or to meet the purpose and need would be the same among all the curb options. All options would make use of textured delineation at the edge of the curb or pan unit; truncated domes at designated transit way and roadway crossings and potentially at designated shuttle stops; directional indicators within the pedestrian walkway; amenity zones with fixed furnishings; and transit lane indicators. Textured delineation at the edge of the curb or pan unit would be fabricated on the granite pavers and would not adversely impact the historic pattern or materials. The truncated domes would visually disrupt the historic pattern; minimizing this disruption will continue to be considered as the design evolves.
Design features for drainage would be the same for all curb options. Drainage inlets on the Mall currently consist of linear metal grates contained within the 2-foot linear curb strip. Under all curb options, the drainage flowline and inlets would move to the new edge of transit way, and surface runoff would drain into new inlets contained within the 2-foot-wide linear vertical curb or pan strip. Additionally, under any of the curb options, some areas of the Mall could be designed with supplemental drainage to remain in its existing location, and surface runoff would drain into or in line with the proposed tree wells. The drainage design would not introduce a new linear element into the historic pavement pattern, and inlets would be designed to be context sensitive or resemble the existing inlets to minimize harm to the property.

All curb options would construct the curbs and/or pans in the same size, material, color, and location within the pattern as the existing curbs and pans to minimize harm to the property.

**Factor (ii): The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection**

This is not a distinguishing factor in determining least overall harm among the curb options. The relative severity of the remaining harm after mitigation would be the same among all curb options because both curbs and pans currently exist on the Mall, would have the same effect on the pavement pattern, and would have the same additional features including visual and tactile walking surface indicators and drainage features.

**Factor (iii): The relative significance of each Section 4(f) property**

This is not a distinguishing factor in determining least overall harm among the curb options. All curb options require use of the same Section 4(f) property, and there is only one Section 4(f) property being considered in this least harm analysis.

**Factor (iv): The views of the official(s) with jurisdiction over each Section 4(f) property**

This is not a distinguishing factor in determining least overall harm among the curb options. The SHPO is the official with jurisdiction for the 16th Street Mall historic property and has been part of the Section 106 consultation process. While the SHPO has not reviewed the Section 4(f) evaluation, the Section 106 Consulting Parties, including SHPO, didn’t indicate that any of the three options would have more harm on the 16th Street Mall historic property than another. They stated that the presence or absence of a vertical curb is not a distinguishing factor in the design considerations, as the original intent for the design of the Mall likely did not include curbs but the final design did include curbs, and both vertical curb and pan conditions are present on the Mall. While the consulting parties did not express concern over whether a vertical curb, pan, or hybrid containing both types of curbs is implemented, they did express concern that the curb not further impact the pattern. The consulting parties noted that of the common elements needed to comply with ADA and safety, mobility, and public use guidance to meet the purpose and need for the Project, their concerns were with the fixed furnishings covering the pattern and/or not being designed or placed carefully. The consulting parties noted that an option that required more fixed furnishings would represent greater harm to the historic property.
Factor (v): The degree to which each alternative meets the Purpose and Need for the project

All options would employ the same design features (textured delineation, truncated domes, directional indicators, amenity zones with fixed furnishings, and a transit way indicator) to comply with the ADA and be consistent with FHWA guidance for accommodating pedestrians with vision disabilities on shared streets (FHWA, 2017). Other features of the curb options would differ in their ability to meet the purpose and need.

Vertical Curb Option

The vertical curb option would provide a small physical barrier at shuttle stops and along the transit way to contain the Free MallRide shuttles in the transit way if they slip on the pavement during inclement weather.

The vertical curb option would maintain a 10-inch or lower height for boarding and alighting shuttles and would improve transit mobility compared to the pan option. The option would comply with American Public Transportation Association guidelines, which call for a step under 16.5 inches. Additionally, the shuttles contain foldout ramps for accessibility; these ramps are designed to work with a vertical curb or deploy directly to the ground. The slope of the ramp when deployed to the ground would comply with ADA but would be steeper and more difficult to ascend than when deployed to a curb.

The vertical curb option provides inferior mobility for pedestrian wheelchair users than the other curb options; wheelchair users would continue be able to cross the Mall only at cross streets and alleys. For visually impaired users, the vertical curbs provide a physical delineation that is easy to navigate.

The vertical curb option provides a less flexible space for current and future public use special events than a flat surface with no curb would provide. The option would maintain an elevation change for pedestrians crossing the Mall, particularly during special public events when transit is temporarily moved off the Mall to create a plaza-like environment.

Pan Option

The pan option provides a more flexible space for current and future public use than the vertical curb option, with a flat surface across the width of the Mall for pedestrian use during public events that temporarily close the Mall to transit service and other vehicles.

The pan option would not provide a physical barrier at shuttle stops to contain the Free MallRide shuttles in the transit way if they slip on the pavement while starting or stopping during inclement weather.

The pan option would provide challenges for riders at transit stops, including passengers with mobility devices, where the boarding and alighting height would be 14 inches. Although it would comply with American Public Transportation Association guidelines, which call for a step under 16.5 inches, it is a higher distance than under the vertical curb option. Additionally, the shuttles contain foldout ramps for accessibility; while these ramps are designed to work with a vertical curb or deploy directly to the ground, without a 4-inch vertical curb, the ramp angle would be steeper but still meet ADA guidelines (Calmo, 2018).

The pan option would provide greater mobility for pedestrian wheelchair users who would be able to cross the Mall at any location rather than only at cross street intersections and alleys.
with the vertical curb option. For visually impaired users, the pan design would include textural or other delineating features to allow comfortable and safe navigation.

**Hybrid Curb Option**

The hybrid curb option would maintain the advantages for boarding and shuttle traction/operations of the vertical curb option at transit stops and provide more flexibility and permeability to use the Mall when transit is not operating, such as during special events. It would also provide more flexibility for ADA users, providing desirable wheelchair boarding height or transit users and better accessibility for wheelchairs to cross the Mall, while also preserving the ability to employ other mitigation measures to aid visually impaired users.

**Factor (vi): After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f)**

This is not a distinguishing factor in determining least overall harm among the curb options. As described in the Project EA, the Project does not adversely affect other resources, and the benefits of the Project are similar.

**Factor (vii): Substantial differences in costs among the alternatives**

This is not a distinguishing factor in determining least overall harm among the curb options. The cost of the options would be similar and within the margin of error for conceptual level estimates.

**Summary**

Most of the factors for the least harm analysis do not distinguish among the vertical curb, pan, and hybrid curb options. However, the hybrid curb option provides more flexibility for public use and provides advantages for boarding and operations at transit stops compared to the consistent vertical curb or pan options. Therefore, based on factor (v), the hybrid curb option appears to meet the Project purpose and need to a greater degree and cause the least overall harm of the curb options. FTA will make a final determination after hearing from the officials with jurisdiction.
6 Measures to Minimize Harm

The Section 4(f) regulations state that FTA may not approve the use of a Section 4(f) property unless it determines that the proposed action includes all possible planning, as defined in 23 CFR § 774.17, to minimize harm to the property resulting from such use. Throughout the planning process, including the Section 106 consultation, FTA, RTD, CCD, consulting parties, and other stakeholders have discussed ways to avoid or minimize impacts to the historic 16th Street Mall property, while still meeting the purpose and need of the proposed Project. These measures are referred to as design commitments. The consulting parties, stakeholders, and the public have provided input directly leading to the incorporation of these design commitments. The following are the design commitments outlined in the draft Programmatic Agreement (Appendix C) the LPA that minimize harm to the 16th Street Mall property:

- Maintain overall design concept of pavement pattern of the Mall surface by retaining the pattern between building faces.
- Retain the 45-degree diagonal grid pattern.
- Maintain spatial relationship between trees and light standards.
- Retain a granite paver surface in the same three colors as the original design.
- Retain pedestrian permeability across the Mall.
- Incorporate only minor changes to the overall pattern of the granite pavers from the existing design.
- Continue using replica light fixtures in linear combination with the trees.
- Replace trees with tree species that maintain the design’s unifying use of trees and adheres to the design principles of parallel tree rows and block-to-block allée.
- Preserve the existing spatial configuration and materials (including curbs and pans) of the half-block plaza between Cleveland Place and Broadway.
- Retain the three rooms of the Mall with asymmetrical ends and symmetrical center section in keeping with the beginning, middle, and end design.
- Retain spatial relationships of trees and lights within the pattern on asymmetrical blocks.
- Retain a single row of aligned trees for 12 blocks.

Outstanding design decisions that could affect character-defining features and represent additional opportunities to minimize harm will be the subject of additional Section 106 consultation as outlined in the Programmatic Agreement and include the following:

- Treatment of street furnishings and amenities, including the location and form (footprint, height, type) of fixed furnishings.
- Fountain locations and designs.
- Design of features affecting the pavement pattern, such as tree grates, drainage inlets, and features to comply with ADA requirements (for example, curb ramps and shuttle loading loading).
Appropriate mitigation measures to address the adverse effect will be established through Section 106 consultation that will continue among FTA, SHPO, CCD, RTD, and consulting parties as outlined in a binding Programmatic Agreement. The Programmatic Agreement will be executed prior to finalizing the Section 4(f) statement; completion of the Programmatic Agreement documents the planning to minimize harm to the Mall property.
7 Coordination

The Section 106 consultation process was initiated in June 2017 and is ongoing. The FTA and RTD held 10 consulting party meetings between June 2017 and December 2018 to discuss the definition of the APE; the historic properties identified within the APE; the alternatives analysis, including the design, materials, and trees; Form 1403, which describes the 16th Street Mall’s character-defining features and significance; the determination of effects to the identified historic properties from the LPA; and mitigation strategies and measures. A Programmatic Agreement will be executed to stipulate measures to mitigate the adverse effect on the 16th Street Mall property and to provide ongoing input from Section 106 consulting parties to the Mall’s final design and construction.

The following organizations are participating in the Section 106 consultation process:

- Advisory Council on Historic Preservation
- CCD
- Colorado Preservation, Inc.
- Colorado SHPO
- DDP
- Denver Landmark Commission
- FTA
- Historic Denver
- Lower Downtown District
- National Trust of Historic Preservation
- RTD

Representatives of the Cheyenne and Arapaho Tribes, Comanche Nation, and Apache Tribe and their Tribal Historic Preservation Officers have been invited to participate and receive meeting notifications and summaries. A representative of the Cheyenne and Arapaho Tribes requested to be copied on all consultation materials but is not actively participating in the consultation. No responses were received from other tribes.

The Cultural Resources Technical Report (Appendix A) contains more detailed information about the consultation process, meeting subjects, and other specifics about input and comments from the consulting parties.
8 References


Downtown Denver Business Improvement District, City and County of Denver, Regional Transportation District, and Downtown Denver Partnership (BID et al.). 2010. *16th Street Urban Design Plan*.


Meeting the Challenge (MTC). 2010. *A Discussion of Accessibility Issues for the 16th Street Mall Project*.


Regional Transportation District (RTD). 2016b. *Bus Infrastructure Standard Drawings*.

Regional Transportation District (RTD). 2017a. *RTD Free MallRide Service Plans and Ridership*.

Regional Transportation District (RTD). 2017b. *RTD Free MallRide Service Plans and MetroRide Current and Forecast Ridership*.

Regional Transportation District (RTD). 2017c. “*Hard Stop*” Report.

Regional Transportation District (RTD). 2017d. *Pedestrian Claims Data*.

Regional Transportation District (RTD). 2017e. 2017 *RTD Customer Satisfaction Survey*.


The following list represents revisions to the *16th Street Mall Alternatives Analysis and Environmental Clearance: Cultural Resources Technical Report* since it was completed in June 2018.

<table>
<thead>
<tr>
<th>Page and Section No.</th>
<th>Correction</th>
</tr>
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<tbody>
<tr>
<td>Page 5-6; Section 5.2 Historic Properties</td>
<td>The introductory sentence is corrected from 33 historic properties to 32 historic properties. (Table 5-1 is correct, with 32 properties listed.)</td>
</tr>
<tr>
<td>No page number; Section 6 Findings of Effect</td>
<td>An LPA Design Option was developed in response to input received during Section 106 consultation. The LPA Design Option would have the same Section 106 determination of effects as the LPA, with 1 Adverse Effect, 30 No Adverse Effect, and 1 No Historic Properties Affected determinations. The details of the effects of the LPA Design Option on cultural resources are described in the <em>16th Street Mall Alternatives Analysis and Environmental Assessment (EA)</em> (Section 3.2, Cultural Resources, pages 3-30—3-33) (FTA, 2019).</td>
</tr>
<tr>
<td>Page 6-5; Section 6.2.1.4 Design Options for Transitway Delineation</td>
<td>A hybrid of vertical and pan curbs has been included in the Project curb design. The hybrid curb option is described in Section 2.4.1.4 Edge Delineation of the EA (page 2-12) A description of the effects of this edge delineation on the historic 16th Street Mall property is presented in Section 3.2 Cultural Resources of the EA (pages 3-26 and 3-27).</td>
</tr>
<tr>
<td>Page 6-11, Section 6.3 Summary</td>
<td>The Madison Hotel/Harris Hotel is removed from Table 6-2 because it has been demolished.</td>
</tr>
<tr>
<td>No page number; Section 7 Avoidance, Minimization, and Mitigation</td>
<td>The discussion of avoidance, minimization, and mitigation measures is updated in the <em>Draft 16th Street Mall Section 4(f) Evaluation (Section 4)</em> (FTA, 2019) and Section 3.2.5, Cultural Resources Avoidance, Minimization, and Mitigation Measures, in the EA.</td>
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<tr>
<td>Title page and page 2; Attachment 2 – 16th Street Mall Form 1403</td>
<td>The final 16th Street Mall Architectural Inventory Form 1403 replaces the form in Attachment 2.</td>
</tr>
<tr>
<td>Attachment 3 – Section 106 Consultation Record</td>
<td>Attachment 3 contains the Section 106 consultation record through February 2018. The EA Section 5.3, Section 106 Consultation, summarizes the Section 106 consultation through March 2019. EA Appendix C (Agency Coordination and Correspondence) contains the Section 106 consultation record through March 2019.</td>
</tr>
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<td>Attachment 4 – Historic Properties Map Book and Attachment 9 – Map Book Project Limits</td>
<td>Property 5DV.500 (1555 Welton St) is added to the Attachment 4 map book showing historic properties and the Attachment 9 map book showing the project limits in relation to historic properties.</td>
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<td>ACHP</td>
<td>Advisory Council on Historic Preservation</td>
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<td>APE</td>
<td>area of potential effects</td>
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<tr>
<td>CCD</td>
<td>City and County of Denver</td>
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<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
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<td>DDP</td>
<td>Downtown Denver Partnership</td>
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<td>EA</td>
<td>environmental assessment</td>
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<td>geographic information system</td>
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<td>FTA</td>
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<td>Regional Transportation District</td>
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<td>SHPO</td>
<td>State Historic Preservation Officer</td>
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<td>USC</td>
<td>United States Code</td>
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SECTION 1

Introduction

Cultural resources are protected by a number of statutes and regulations at all levels of government and must be taken into consideration during the National Environmental Policy Act (NEPA) process and documented in an environmental assessment (EA). This report examines potential impacts on cultural resources as a result of the 16th Street Mall (Mall) Alternatives Analysis and Environmental Clearance Project (Project). The Project is funded in part by a grant from the Federal Transit Administration (FTA), which makes it a federal undertaking under the National Historic Preservation Act (NHPA). The FTA is the lead federal agency.

Using existing materials and additional research, this report was written and compiled by Sara Orton, an architectural historian with CH2M HILL, Inc. (CH2M), who meets the Secretary of the Interior’s Professional Qualifications Standards for architectural history and history.

There are 33 identified historic properties within the project Area of Potential Effects (APE): the Mall and 30 structures adjacent to the Mall, two districts that intersect with the Mall, and one archaeological site. The analysis presented in this report finds that the undertaking would have No Adverse Effect on the 33 properties adjacent to the 16th Street Mall and an Adverse Effect on the 16th Street Mall historic property. This adverse effect will be addressed through consultation in a legally-binding agreement document.

This report takes information from the Project EA and its associated technical reports, and is organized as follows:

- **Section 1, Introduction**, defines the Project purpose and need, as well as its goals.
- **Section 2, Project Alternatives**, describes the Project and its components.
- **Section 3, Regulatory Context**, discusses the regulations pertinent to cultural resources in relation to this undertaking.
- **Section 4, Methodologies**, defines the process used in this evaluation and analysis.
- **Section 5, Identified Historic Properties**, identifies and discusses historic properties in the APE.
- **Section 6, Findings of Effect**, presents the effects analysis and findings.
- **Section 7, Avoidance, Minimization, and Mitigation**, discusses avoidance, minimization, and mitigation measures as they relate to various Project alternatives.
- **Section 8, Conclusions**, provides the effect finding for the undertaking.
- **Section 9, Bibliography**
SECTION 1 – INTRODUCTION

1.1 Project Description

The 16th Street Mall is Denver’s busiest transit artery and premier public space; it is one of the longest pedestrian and transit malls in the world and is federally designated as a fixed guideway. The Mall was designed in the late 1970s as a transit and pedestrian mall by the renowned designers I.M. Pei & Partners and Hanna/OLIN. Construction of the Mall was completed in 1982, with an iconic diamond-patterned granite paver surface inspired by the design of a Navajo blanket and resembling a diamondback rattlesnake skin. Through the free bus service on the Mall, known as the Free MallRide, the Mall eliminated hundreds of bus trips from downtown Denver streets, reducing traffic congestion, and helped revitalize the downtown business environment with a unique pedestrian- and transit-oriented public space.

The original 12.5 blocks of the Mall, from Market Street to Broadway, are now over 35 years old and in need of repair and revitalization. Multiple recommendations and studies to address the Mall’s infrastructure have been put forth over the past decade by the City and County of Denver (CCD), Regional Transportation District (RTD), Downtown Denver Partnership (DDP), and Downtown Denver Business Improvement District (BID), but none of them have resulted in a comprehensive program of improvements.

RTD, CCD and DDP, with funding support from the FTA, propose to implement, through the Project (undertaking), improvements to the Mall to address infrastructure, mobility, safety, and public use. The Project limits cover the length of the Mall from Market Street to Broadway, the 80-foot width of the Mall from building face to building face, and portions of cross streets intersecting the Mall (Figure 1-1).

Figure 1-1. Project Limits and Study Area
1.2 Project Purpose and Need

1.2.1 Purpose of the Undertaking

The purpose of the Project is to develop and implement a flexible and sustainable plan for the Mall to address deteriorating infrastructure, provide equitable and sufficient space for high-quality public gathering opportunities, improve pedestrian and vehicle safety, and continue reliable two-way transit shuttle service on the Mall while honoring the Mall’s use and iconic design.

1.2.2 Need for the Undertaking

The Mall has failing and outdated infrastructure and limited space for safe and engaging public gathering activities. The deteriorating infrastructure causes safety hazards for both pedestrians and vehicles, and requires frequent and costly maintenance. The Mall attracts large numbers of people, but a low percentage of people stop to spend time on the Mall. The current configuration of the Mall creates a situation in which pedestrian corridors are constrained, creating frequent pedestrian and shuttle conflicts. The following improvements are needed:

- Address deteriorating infrastructure to allow reasonable maintenance frequency and costs to businesses and taxpayers.
- Improve safety for pedestrians and vehicles.
- Maintain mobility for desired transit operations and for all users.
- Increase opportunities for public use of the Mall as an iconic civic space for leisure, commerce, and tourism.

1.2.2.1 Infrastructure

Most transportation projects are assumed to have a 30-year design life, which was reached in 2012 for the Mall. Improvements are needed to address the original design and construction of the Mall and its deteriorating infrastructure, which causes safety concerns, a high frequency of maintenance activities, and expense.

The transit way was constructed with 4-inch-thick granite pavers that were installed in a mortar setting bed over a series of concrete slabs supported by footers. The Mall’s pedestrian area consists of 2-inch granite pavers in a mortar setting bed, which overlays a series of concrete slabs. **Figure 1-2** illustrates the design of the Mall’s pavement system.
The Mall’s pavement system does not provide drainage for water that seeps into the mortar setting bed below the pavers; when moisture infiltrates below the surface of the pavers, it can be trapped there for an extended period of time. The mortar setting bed stays saturated with water for much of the year and is subjected to numerous freeze-thaw cycles. Each time water within the pavement system freezes, it expands and erodes the saturated material, causing severe deterioration over time. The deteriorated mortar setting beds do not provide the necessary support for the pavers, and pavers become dislodged and sometimes damaged, requiring replacement (Atkinson, 2015).

1.2.2.2 Safety
The original granite pavers had a flamed finish to provide traction for pedestrians and vehicles. To create a flamed finish, a high-intensity flame is applied to the surface of the stone, causing the stone crystals to pop and creating a highly textured, rough surface with no shine. Over time, dirt has filled the rough texture of the granite pavers, creating a smooth surface that presents a safety hazard for pedestrians and vehicles. When wet or icy, pedestrians slip on the slick surface, and the transit shuttles have difficulty gaining traction to start and stop.

Pedestrians and transit shuttles use the Mall very close to each other. The walkway, curb, and transit lanes are constructed of the same granite material and do not provide consistent visual indicators or obvious delineation between the pedestrian walkways and transit lanes. Current RTD standards and guidance recommend visually and physically separating walkways from transit lanes to minimize instances of pedestrians inadvertently walking into transit lanes (RTD, 2016a; NACTO, 2013; NACTO, 2016; FHWA, 2017).

The current configuration of the Mall, particularly in the median blocks, creates a condition where space is constrained for pedestrians during peak hours. Pedestrians may walk into the transit lanes or immediately adjacent to transit lanes, where they could be hit by shuttle bus mirrors or cause buses to stop sharply; this creates safety concerns for bus riders as well as
pedestrians. A review of existing pedestrian crash and RTD claims data reveals that five times more pedestrian/bus crashes occur in the existing median blocks than in the asymmetrical blocks (reference the *16th Street Mall – Pedestrian, Bicycle, and Transit Vehicle Crash Analysis* technical memorandum included in Appendix B of the EA). Conflicts between pedestrians and shuttles need to be reduced through a design of the Mall that incorporates current best practices for pedestrian and transit way safety.

### 1.2.2.3 Mobility

In the 1970s, downtown Denver was experiencing high rates of bus congestion, especially on 16th and 17th streets, which limited convenient access to those streets. In addition, the design of pedestrian areas was secondary, which discouraged pedestrian activity. The Mall was a joint solution put forth by the downtown Denver business community and RTD to reinvent 16th Street as a pedestrian destination and relieve bus congestion in downtown Denver (RTD, 1978). The Mall was designed to operate with a free transit shuttle bus service (called the Free MallRide) and transfer stations at each end (BID et al., 2010). Sidewalks and transit ways provide and accommodate mobility on the Mall. The Free MallRide shuttle ridership is 39,000 riders each weekday, which is anticipated to increase to approximately 70,000 passengers per day by 2035 (RTD, 2017a and 2017b). The current capacity of the two 8-foot pedestrian walking areas on the median blocks is approximately 3,840 pedestrians per hour, while the current capacity of the 8- and 14-foot pedestrian walking areas on the asymmetrical blocks is approximately 5,280 pedestrians per hour (Gehl, 2016). The 8-foot pedestrian walking areas do not meet City and County of Denver (CCD) standards for downtown sidewalk width of 10 feet (CCD, 1993). During peak hours, the capacity is further reduced, as people gathering at Free MallRide bus stops obstruct the pedestrian walkways on the median blocks and narrow sides of the asymmetrical blocks.

Although the design of the Mall preceded the 1990 Americans with Disabilities Act (ADA), the Mall incorporates features of accessibility that are now required. Currently, furnishings and other elements (for example, fountains) in the median and the volume of pedestrian traffic at times makes access by people using wheelchairs difficult (BID et al., 2010). *A Discussion of Accessibility Issues for the 16th Street Mall Project* (MTC, 2010) provides an evaluation of existing conditions and notes, among other observations, that the medians present challenges for accessibility.

### 1.2.2.4 Public Use

Improvements are needed to provide a flexible configuration that allows for transit use and pedestrian circulation to safely and comfortably continue while providing adequate space for quality public gathering opportunities.

RTD completed an EA in 1978 and selected the Transitway/Mall Alternative based on the following criteria: (1) Provide more efficient bus service to city and suburban neighborhoods, (2) Lessen traffic congestion in downtown, and (3) Create a new pedestrian environment in the downtown, a place for people (RTD, 1978). The Mall opened in 1982. Today, the Mall is a diverse retail destination with a variety of retailers, hybrid retail and entertainment venues, drugstores, tourist-oriented shops, and a variety of restaurants all accessible via the Free MallRide. The Mall has become the spine of downtown Denver.
The CCD study *Downtown Denver 16th St Mall: Small Steps Towards Big Change* (Gehl, 2016) evaluated how people currently use the Mall and recommended steps to increase its use as a destination. The study found that only 1 percent of people moving through the Mall stop to spend time on the Mall on an average weekday; this number increases to 3 percent on weekends. The Mall needs to attract more people engaged in staying and gathering activities such as sitting, eating, and playing.

The study evaluated which conditions within the Mall’s existing configuration increased the number of people spending time on the Mall by setting a baseline for Mall use without special programming, then experimenting with selected conditions and observing the results. Patio seating had the largest positive effect on people spending time on the Mall, followed by live music and elements such as interactive water zones and interactive art. Removable seating and other temporary installations provided additional invitations for people to stay on the Mall. The Mall’s physical design needs to provide the space and multifunctionality to accommodate a variety of uses and installations for placemaking.

Within the median blocks, where transit lanes separate the public realm and pedestrian space into three separate zones, opportunities for safe and engaging public use and amenities are limited by space constraints. These blocks contain two 8-foot-wide pedestrian walking areas, two 9-foot-wide patio and gathering spaces, two 12-foot-wide transit lanes, and a 22-foot-wide median (*Figure 1-3*). The pedestrian spaces in these blocks are not wide enough or separate enough from the transit lanes to provide a comfortable public gathering experience.

*Figure 1-3. Cross Section of Existing Median Blocks*

The median is set apart from other pedestrian areas physically and by transit service, which isolates the space, restricts natural surveillance, and results in low ownership of the space by adjacent businesses and users; as a result, the space lacks consistent activation. The median space, while slightly larger than the sidewalks to the sides of the Mall, is too small to provide adequate and comfortable gathering space for pedestrian in between the transit lanes. The
space is underused, as people prefer to gather along the edges, and inherently back away from fast-moving objects like the buses (Gehl, 2016).

The design of the asymmetrical blocks is more conducive to quality public gathering spaces. Public gathering opportunities are greater on the wider side of the block, with its double row of trees and ample space for both walking and staying activities, than on the narrower side, which lacks trees and has less space for both walking and staying. The narrow side lacks the needed visual delineation between transit lanes and pedestrian zones.

Feedback from the public and stakeholders indicates a negative perception of safety on the Mall, with references to loiterers, panhandlers, and criminal activity. The negative perception of safety, lack of natural surveillance in medians, and lack of active edges (for example, building facades with activity and transparency) in some blocks inhibits positive public use of the Mall. Activating public space is essential to the perception of safety; when more people gather outside, the sense of safety increases and negative social behaviors decrease (Gehl, 2016).

1.2.3 Project Goals

Project goals were determined by meeting with agencies and stakeholders during Project scoping activities (including small group interviews, a stakeholder workshop, a meeting with historic preservation organizations, and a set of public open houses) and meetings with the Project Leadership Team. The following goals were developed:

- Maintain and improve transit operations to provide convenient and efficient travel in downtown Denver, including the Free MallRide and Free MetroRide.
- Maintain and improve economic viability of businesses on the Mall and on adjacent streets.
- Provide a balance of amenities fronting properties on both sides of the Mall.
- Maintain and improve a sense of security on the Mall.
- Enhance the public image of the Mall as one of Denver’s primary identity elements.
- Provide a flexible, dynamic space over time of day, season, and year.
- Provide a cost-effective solution over the total lifecycle of the Mall.
- Honor the Mall’s design, building upon its character-defining features.

1.2.4 Area of Potential Effects

An APE is the area within which the direct and indirect effects of the Project may cause alterations to the character-defining features of historic properties. The Project APE was established in consultation with the State Historic Preservation Office (SHPO) through the Office of Archaeology and Historic Preservation (OAHP); consulting parties were identified starting in June 2017. The Project APE, which includes the 16th Street Mall from Market Street to Broadway and one parcel on each side of the corridor (Figure 1-4), was discussed at the first consultation meeting on July 7, 2017, at the third consultation meeting on September 27, 2017; a revised APE at the meeting on November 11, 2017. The revised APE did not encompass any additional properties; parcels and property lines were updated based on a site visit and additional research. No objections were voiced at any of these meetings regarding the appropriateness of the APE nor the revised APE.
The APE includes 32 properties listed on or eligible for listing on the National Register of Historic Places (NRHP), including the Mall itself. Section 5.0 discusses these properties in detail.

Figure 1-4. Area of Potential Effects and Boundary of the 16th Street Mall Historic Property
SECTION 2
Project Alternatives

2.1 No Build Alternative

The No Build Alternative represents future conditions without the construction and operation of the Project. The No Build Alternative would maintain the existing alignment and configuration of the Mall (Figure 2-1), continue standard maintenance activities and targeted repairs (i.e., repairs to the pavement system and other infrastructure), and continue implementation of safety strategies, including the 2016 DDP Downtown Security Action Plan. CCD and RTD have an Intergovernmental Agreement (IGA) through 2022 regarding maintenance responsibilities for the Mall.

The No Build Alternative would not repair or upgrade the belowground utilities and infrastructure. The trees and tree boxes would not be replaced, so the condition of the trees would remain the same and there would be no plan for replacing trees that have died or been removed. Under the No Build Alternative, the granite pavers would continue to be replaced in an ad hoc manner as the need arose or replaced with asphalt or other materials. Because the underlying existing deteriorating infrastructure would not be updated, safety hazards for pedestrians and vehicles, and the frequent and costly maintenance would continue.

Figure 2-1. Existing Cross-section
The No Build Alternative includes the current transportation system with the committed transportation improvements in the Denver Regional Council of Governments (DRCOG) 2018-2021 Regional Transportation Improvement Program and 2040 Fiscally Constrained Regional Transportation Plan.

The No Build Alternative does not meet the purpose and need for the Project but is retained as a basis for comparison of the environmental impacts of the Locally Preferred Alternative (LPA).

2.2 Locally Preferred Alternative

This section describes the LPA developed by RTD, CCD, and DDP, including capital improvements, transit operations, traffic operations, and construction activities. Figure 2-2 illustrates the proposed alignments and delineates sidewalks and the transit way within the proposed alignments. Attachment 1 contains a full corridor plan view of the LPA compared to the existing conditions. The LPA would maintain current and planned Free MallRide service levels on the Mall, per RTD’s service plans and Denver’s Downtown Multimodal Access Plan (CCD et al., 2005).

Figure 2-2. Locally Preferred Alternative Cross Section

2.2.1 Capital Improvements

This section describes the capital improvements that will comprise the LPA.

2.2.1.1 Alignments and Transitions

From Market Street to Arapahoe Street and from Tremont Street to Broadway, the alignment would be the new asymmetrical cross-section design (Figure 2-2). The new asymmetrical cross-section design removes the existing small strip with light fixtures from between the transit way lanes, pushes the existing two 12-foot transit way sections together into a single transit way comprising two adjacent 12-foot transit lanes, increases the size of the sidewalk on the narrow side of the cross section from 17 feet to 24 feet, and reduces the sidewalk on the wide side of the cross section from 33 feet to 32 feet. Each sidewalk would consist of
patio/gathering space, tree/amenity zone, and a minimum 10-foot-wide pedestrian walking area free of encroachments from elements such as furnishings, kiosks, and bus stops.

Between Arapahoe and Tremont streets, the alignment would be the center-running design (Figure 2-2), which places the two 12-foot transit ways together into a single transit way comprising two adjacent 12-foot transit lanes, without a median separating them. This center section has equal amounts of sidewalk space, 28 feet, on each side of the transit way, which would allow flexibility for programing the space in a manner that will allow more pedestrians to use it. Each sidewalk would consist of patio/gathering space and tree/amenity zone, and between them a minimum 10-foot-wide pedestrian walking area free of encroachments from elements such as furnishings, kiosks, and bus stops.

The LPA could be implemented with curbs, as it exists currently, or with a design option that implements the center-running and new asymmetrical cross-section designs without curbs. Constructing the LPA with curbs replicates the existing condition and is preferred for transit operations. Constructing the LPA without curbs provides a more flexible public space and is preferred for programming flexibility. With or without curbs, the paver surfaces and grade changes within pedestrian areas, the transit way, and roadway crossings will be compliant with ADA.

The LPA would maintain a beginning, middle, and end, for the Mall. Transitions between cross-section designs would occur at four locations on the Mall:

1. The western Project limits at Market Street
2. At Arapahoe Street, where the design changes from new asymmetrical to center running
3. At Tremont Street, where it changes back from center running to new asymmetrical
4. At the eastern Project limit at Broadway

At the Arapahoe and Tremont street transitions, the east- and westbound transit lanes would shift 4 feet; under existing conditions the eastbound transit way doesn’t shift, and the westbound transit lane shifts 16 feet. At the Project limit transitions, the LPA would tie into the existing transit ways. At Tremont Street, the Project would transition to the existing conditions at Broadway. Figure 2-3 illustrates the transition from the center-running transit lanes to the new asymmetrical transit lanes at Tremont Street.

Figure 2-3. 16th Street Mall Transit Lane Transition at Tremont Street
2.2.1.2 Pavement Materials and Pattern

The LPA would be implemented with granite pavers arranged to mimic the Mall’s existing color and pattern in the transit way and pedestrian areas. The pavement pattern would retain the original I.M. Pei-designed 45-degree diagonal grid and the small, medium, and large diamond patterns in the same (or approximately the same) spatial relationships as the original design. The pattern can be implemented with or without curbs. Localized minor adjustments may be required during subsequent design phases to accommodate unforeseen design challenges, accommodate infrastructure needs, or ADA compliance.

The granite pavers will be arranged and secured on new concrete sub-base slabs. The existing concrete sub-base slabs will be removed and replaced, complete with a new system to drain moisture that penetrates the surface.

2.2.1.3 Trees and Tree Infrastructure

The LPA will remove the existing trees and replace them with a variety of tree species that fit within the context of the design and thrive in Colorado’s climate. Tree placement will honor the existing character of the Mall by retaining geometric and spatial relationships. Tree species would be selected using current CCD forestry requirements and similar criteria to those used to select tree species during design of the original Mall.

The LPA would remove the existing tree boxes with 300-cubic-foot soil capacity and replace them with new suspended tree infrastructure that provides 1,000 cubic feet of soil volume, such as a silva cell or equivalent system. Existing landscape irrigation systems would be removed and replaced.

2.2.1.4 Utilities and Technologies of the Future

The LPA will upsize electrical conduits and wiring belowground to allow for expanded capacity and will remove and replace landscape irrigation and drainage infrastructure. The LPA will also provide the opportunity to install fiber optic and/or other underground telecommunications
utilities to meet current and future demands. Wi-fi or other next-generation communication systems may be installed aboveground, to allow for future technologies, but not as a part of this undertaking.

The surface and sub-base drainage system will discharge water to inlets connected to the local storm sewer; water quality treatment features will be installed to remove pollutants and sediment from the water.

Existing underground utilities (e.g., storm sewer, sanitary sewer, water mains, natural gas, and steam) will be evaluated in subsequent design phases and in coordination with utility companies. At that phase, it may be determined that these utilities should be replaced, upgraded, or left in place.

2.2.1.5 Safety and Security

The LPA will include delineating features between the transit way and the pedestrian areas on the Mall, including the placement of trees, lights, and other furnishings (in the tree/amenity zone) between pedestrian walking areas and transit lanes, consistent with RTD standards (RTD, 2016a) and guidance for shared streets (NACTO, 2013; NACTO, 2016; FHWA, 2017). The following additional delineating features may also be considered:

- Curbs
- Visual delineations such as in-pavement lighting or different color materials
- A strip of textured surface, detectable to the visually impaired
- Bollards
- Other delineating features that would not impede movement across the Mall

The new granite pavers would achieve a minimum coefficient of friction—to be determined by RTD in a subsequent design phase—to reduce incidents related to slipping and sliding of both pedestrians and vehicles. Grooved surface material in the transit lanes at bus stops to assist buses with traction in inclement weather would also be considered.

Crime Prevention Through Environmental Design (CPTED) principles promote the design, maintenance, and use of the built environment to enhance quality of life and to reduce both the incidence and fear of crime.

2.2.1.6 Lighting, Signage, and Furnishings

The existing pole lighting on the Mall was replicated and replaced in 2016. The LPA would reuse the existing lighting as well as provide additional lighting, as needed. New pole lighting fixtures would replicate the existing pole light fixtures. Other types of light fixtures could be incorporated into the design using CPTED principles.

The LPA will incorporate signage, furnishings, and water features; the design and location of these features will be ADA-compliant and determined during subsequent design phases.

2.2.1.7 Changes to Cross Streets

Bulb-outs would be implemented on cross streets to calm traffic and reduce the crossing distance for pedestrians on those streets, except for streets with space reserved for bicycle or light rail transit (LRT) infrastructure. The elimination of the median would consolidate pedestrian crossings to two locations at each intersection. Details potential pedestrian crossing
controls, such as crosswalks and crossing signals, would be decided during subsequent design phases.

2.2.1.8 Funding and Intergovernmental Agreements

The LPA would be funded through a cooperation between CCD and RTD. CCD would use Downtown Urban Renewal Authority (DURA) Tax Incremental Financing (TIF) funds, as well as funds from the recently passed Denver 2017 General Obligation (GO) Bonds. The DURA TIF Board of Commissioners approves the use of DURA TIF funds, and those funds must be used on downtown renewal projects. The use of Denver 2017 GO Bonds was recommended in the 2017 GO Bond – Mayor Recommended Package of Investments (CCD, 2017b). RTD has two federally funded grants to rehabilitate the Mall, which it intends to contribute to the Project. This transfer needs the approval of FTA, DRCOG and the RTD Board, and an IGA between CCD and RTD. The use of FTA grant funds requires FTA and NEPA approval as well as NHPA Section 106 consultation.

Ongoing maintenance of the transit way will be funded through an IGA between CCD and RTD. The level of maintenance is expected to be significantly reduced from existing levels. Funding for maintenance of pedestrian areas will continue to be provided through an IGA between CCD and DDP.

2.2.2 Transit Operations

The LPA would accommodate existing and planned Free MallRide transit operations, LRT operations, and connecting transit services. Visual or textured delineation between transit lanes will be provided during subsequent design phases. Operations for the Free MallRide and connecting transit services would not change as a result of implementing the LPA (reference the Transit Operations technical memorandum in Appendix B of the EA for additional detail about existing and planned transit operations).

2.2.3 Traffic Operations

Implementation of the LPA would not change long-term operational characteristics of the cross streets or permitted vehicles on the Mall. Bulb-outs would calm traffic in cross streets but would not change traffic operations on the cross streets. Within the cross streets capacity, lane width, and traffic controls and timing would follow the same concept of operations.

2.2.4 Construction Activities

This section describes important aspects of the construction process required to implement the LPA within the proposed construction period.

2.2.4.1 Timeline, Phasing, and Access

The LPA would be built using the Construction Manager/General Contractor (CM/GC) project delivery process. During the CM/GC process, a contractor is selected during design of the project to provide input on project construction. Development of an innovative Construction Mitigation Plan (CMP) would be a critical criterion for judging the selection of the successful constructor.

Construction of the LPA is anticipated to take 2.5 to 4 years. Major construction activities on each block would last approximately 8 to 12 months; however, minor construction activities or
unforeseen utility-related construction activities may last longer. Construction would generally occur in two- to six- block segments and each segment would require multiple construction phases.

2.2.4.2 Staging
The selection of staging sites will be decided in subsequent design phases. The process for deciding a construction staging site or sites will include applicable stakeholders (i.e., Project partners, agencies, and affected landowners and business owners).

2.2.4.3 Construction Activities
Construction activities will generally include, and require equipment for, deconstruction, construction of temporary facilities for maintenance of access and safety, construction of permanent subsurface features, and construction of permanent surface, aboveground communications, lighting, and landscape features. It is anticipated that night work may be performed, and 24-hour construction may be required in some cases to accommodate the construction schedule, maintenance of access, or related stakeholder requirements.

Access to the construction site will be controlled through appropriate standards set forth by the Colorado Department of Public Health and Environment, CCD Occupational Safety and Health Administration, the ADA, the Manual on Uniform Traffic Control Devices (FHWA, 2009), and the National Fire Protection Association Standard 130 for Fixed Guideway Transit and Passenger Rail Systems, and by other applicable regulatory requirements. Haul routes to and from the construction site or staging sites will be determined during subsequent design phases. Existing haul routes will be used to the extent practicable.
The term “cultural resources” encompasses properties of the built environment, archeological sites and artifacts, and Native American sites, artifacts, and cultural properties. Native American cultural resources may include human skeletal remains, funerary items, sacred items, and objects of cultural patrimony. Native American traditional resource procurement areas and culturally important regional landscapes are also considered Native American cultural resources and may be traditional cultural properties if they are places that define tribal identity and meet NRHP eligibility criteria.

Archeological sites are places where past peoples left physical evidence of their occupation. Sites may include ruins and foundations of historic-era buildings and structures. Alternatively, they may be surface ruins or underground deposits of Native American occupation debris such as artifacts, food remains (shells and bones), and former dwelling structures. Important archeological sites can qualify as historic properties.

Other types of cultural resources include cultural institutions, lifeways, culturally valued viewsheds, cultural landscapes, places of cultural association, and other valued places and social institutions. Under the 1992 NHPA amendments, these types of resources can be eligible for listing in the NRHP because of their association with cultural practices or beliefs of a living community that are rooted in that community’s history and are important in continuing its cultural identity.

3.1 Federal Regulations

There are various federal laws, regulations, and executive orders that pertain to the identification, treatment, and significance of cultural resources. Federal projects that affect cultural resources are subject to the following primary federal regulations:

**National Environmental Policy Act of 1969 (83 Stat 852; 42 United States Code [U.S.C.] 4321).** The responsible federal agency for this Project, the FTA, (with support from RTD, CCD, and DDP) is charged with ensuring compliance with the Act. NEPA requires that all major actions sponsored, funded, permitted, or approved by federal agencies (generally referred to as federal undertakings) undergo planning to ensure that environmental considerations, such as effects on cultural resources, are given due weight in decision-making. The federal implementing regulations for NEPA are in 40 Code of Federal Regulations [CFR] Parts 1500 through 1508 (Council on Environmental Quality [CEQA]); regulations for FTA actions are in 23 CFR 771. The NEPA regulations include sections on urban quality, historic and cultural resources, and the design of the built environment (40 CFR 1502.16(g)).

**National Historic Preservation Act of 1966 (80 Stat 915; 16 U.S.C. 470).** The NHPA was passed in 1966 as a reflection of the importance of those resources to our national, regional, and local culture. The primary agency for enforcement of this act is SHPO, which implements the regulations (36 CFR 800) issued by the Advisory Council on Historic Preservation (ACHP). When a project receives federal funding or permits, the possible impacts of the project on historic properties must be reviewed. Section 106 of the NHPA requires federal agencies to consider the effects of actions they fund or approve on any district, site, building, structure, or object that is listed in or eligible for listing in the National Register of Historic Places (NRHP).
The regulations implementing Section 106 are codified at 36 CFR 800. The Section 106 review process involves four steps, as follows:

1. Initiate the Section 106 process by establishing the undertaking, developing a plan for public involvement, and identifying other consulting parties.
2. Identify cultural resources within an APE and evaluate their eligibility for inclusion in the NRHP.
3. Assess adverse effects by applying the criteria of adverse effect on historic properties.
4. Resolve adverse effects by consulting with the SHPO and other agencies and consulting parties, including the ACHP, if necessary, to develop an agreement that addresses the treatment of historic properties.

The implementing regulations of the NHPA, 6 CFR 800.16(l)(1), define historic properties as any prehistoric or historic district, site, building, structure, or object included in or eligible for the NRHP (36 CFR 800.16). Under the NHPA, a property is significant if it meets the NRHP criteria listed in 36 CFR 60.4. In addition to significance, a property must retain enough integrity to convey that significance. There are seven aspects of integrity: setting, location, feeling, association, materials, design, and workmanship. Section 106 requires federal agencies and others to consider the effects of proposed projects on historic properties and to provide the ACHP and SHPO with a reasonable opportunity to comment on any undertaking that would adversely affect properties listed in or eligible for listing in the NRHP. Section 106 encourages maximum cooperation with NEPA. This cultural resources report meets the requirements of both NEPA and Section 106 of the NHPA.

**Department of Transportation Act of 1966 (49 U.S.C. 303).** For transportation-related projects, Section 4(f) of the Department of Transportation Act of 1966 (49 U.S.C. 303) and its implementing regulations (23 CFR 774) is another federal regulation that protects historic properties. Section 4(f) resources include any significant publicly owned park, recreation area, or wildlife refuge, or any publicly or privately owned historic property listed in, or eligible for listing in, the NRHP. Section 4(f) applies to all projects that require approval by an agency of the U.S. Department of Transportation, including FTA. Under Section 4(f), FTA and other Department of Transportation agencies cannot approve the use of land from publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historic properties unless there is no feasible and prudent alternative to the use of land, and the project includes all possible planning to minimize harm to the property. The Section 4(f) evaluation of this Project is a chapter in the EA.

### 3.2 Section 106 Consultation

The Section 106 consultation process for this undertaking was initiated in June 2017. The FTA and RTD had six consulting party meetings between June 2017 and February 2018 (inclusive) to discuss the definition of the Project APE; historic properties identified within the APE; the alternatives analysis; the design, materials, and trees; OAH Form 1403, which describes the Mall’s NRHP-eligibility, character-defining features and significance (Attachment 2); and the effects to the identified historic properties from the LPA. The consultation process is ongoing. SHPO has not had an opportunity to concur with FTA’s finding of effects, but the effects have been discussed with the consulting parties at the consulting party meetings. Upcoming
meetings will discuss appropriate mitigation measures to address the adverse effect on the Mall historic property. Resolution of the adverse effect will be stipulated in an Memorandum of Agreement (MOA) to be developed among the consulting parties and the federal agency. The MOA will be executed prior to completion of the NEPA agreement document.

These are the organizations participating in the Section 106 consultation process as consulting parties.

- Colorado SHPO
- Historic Denver
- National Trust for Historic Preservation
- Federal Transit Administration
- Regional Transportation District
- City and County of Denver
- Downtown Denver Partnership
- Lower Downtown District
- Colorado Preservation, Inc.
- Landmarks Preservation, Community Planning and Development
- The OLIN Studio
- Cheyenne and Arapahoe Tribes

Representatives of the Cheyenne and Arapaho Tribes, Comanche Nation, and Apache Tribe have been invited to participate and receive meeting notifications, materials, and summaries. A representative of the Cheyenne and Arapaho Tribes requested to be copied on all consultation materials, but is not actively participating in the consultation. No responses were received from the other tribes.

**Attachment 3** contains a summary of the Section 106 consultation process and correspondence through February 27, 2018.
Methodology

4.1 Records Search

A review of previous studies and nominations, maps, aerial photographs, and historical photographs provided an understanding of the history of the 16th Street Mall. No additional field investigations were conducted for this Project.

The Project area is covered entirely with structures and roadways. Construction activities would take place in areas previously disturbed during construction of the Mall in 1982.

There is an identified historic archaeological site partially within the APE: Site 5DV.9217.1, a former tramway line, begins at E. 16th Avenue and Broadway and is within the APE from E. 16th Avenue to Cleveland Place, but is outside the limits of construction for this Project. The entire Denver Tramway Trolley system is eligible for listing in the NRHP under Criterion A and B. It played an important role in early public transit in Denver and facilitated the development of more distant neighborhoods by giving residents a way to travel between work, home, and recreational opportunities. The South Broadway line was the first electrified line to operate in Denver. It continued in operation from December 1889 to June 1950 when South Broadway was paved over for vehicular traffic and has been buried under the road since then. There would be no direct or indirect impacts to this resource from the undertaking because it is outside the limits of construction.

The vast majority of the properties within the APE have been previously surveyed. However, some of those surveys were completed in the 1980s and 1990s, which indicates a need to reevaluate their NRHP eligibility because of the passage of time since they were last evaluated. RTD met with the OAHP in January 2018 to discuss how to treat the properties within the APE that will not be directly impacted by the LPA. FTA and RTD proposed treating properties as NRHP-eligible in the following cases:

- Assessment status of Needs Data or No Assessment – Built before 1975
- Assessment status of Not Eligible – Field surveyed before 2015, built before 1975
- Assessment status of Noncontributing – Field surveyed before 2000, built before 1975

For the purposes of this undertaking, the properties that meet these criteria are being considered NRHP-eligible for the effects analysis.

4.2 National Register of Historic Places Eligibility

To qualify for listing in the NRHP, a property must have historic significance and integrity, and generally be at least 50 years old; certain properties are exempt from the 50-year rule if they possess exceptional importance. Historic significance may be present in districts, sites, buildings, structures, and objects that possess integrity, which is defined as the ability of a property to convey its significance. The NRHP recognizes seven aspects of integrity: location, design, setting, materials, workmanship, feeling, and association. A property must retain sufficient integrity to demonstrate significance in at least one of the following areas:
SECTION 4 – METHODOLOGY

4.3 Effects Analysis Methods

Section 106 of the NHPA requires federal agencies to take into account the effects a proposed undertaking may have on historic properties. The NHPA’s implementing regulations (36 CFR 800) include specific criteria for adverse effects that must be applied to historic properties that may be affected by federal undertakings. When considering the potential for adverse effects, all reasonably foreseeable impacts must be taken into account, including direct, indirect, and cumulative.

The ACHP has developed regulations that guide federal agencies on how to assess effects of their undertakings on historic properties and mitigate those effects, if necessary. Effects to historic properties are defined in the following ways:

- **No Historic Properties Affected:** Either no historic properties are present, or there is no effect of any kind, neither harmful nor beneficial, on the historic properties.

- **No Adverse Effect:** There is an effect, but the effect is not harmful to those characteristics that qualify the property for inclusion in the NRHP.

- **Adverse Effect:** There is an effect, and that effect diminishes the qualities of significance that qualify the property for inclusion in the NRHP.

An adverse effect is found when an undertaking may alter any characteristic of a historic property that qualifies the property for inclusion in the NRHP in a manner that would diminish the integrity of the property. This includes diminishing the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time or be further removed in distance, or effects that may be cumulative.
Examples of adverse effects to historic properties outlined in 36 CFR 800.5 include, but are not limited to, the following:

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 materials remediation, and provision of handicapped access, that is not consistent with the Secretary of Interior’s standards for the treatment of historic properties (36 CFR 68) 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 deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to a [Native American] or native Hawaiian organization; and

7. Transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property’s historic significance.
SECTION 5

Identified Historic Properties

Section 5.1 presents a brief historical context of the downtown area, primarily of the 16th Street Mall. Section 5.2 provides a listing of the historic properties within the APE and a detailed description of the 16th Street Mall, its NRHP eligibility, significance, and character-defining features.

5.1 Historical Context

Properties dating from the early twentieth century were present when the Mall was installed in the 1980s. The downtown commercial area started to decline by the 1960s and 1970s as a result of population shifts to suburban settings, new trends in retail, and the rise of the automobile. Developers started to create large-scale shopping plazas on readily available land near new suburban tracts, reducing the importance and draw of a downtown commercial corridor. By the 1970s, at least 15 different shopping centers existed in the Denver area outside of the downtown core. As Denver-area residents relied more on the automobile, city streets became more congested and polluted, deterring downtown business growth and pedestrian use (Denver Partnership, Inc. and DRCOG, 1982).

In the 1970s, 16th Street was a two-way vehicular public street with busses and vehicular traffic (Figure 5-1), similar to the current 17th and 18th streets. The corridor was lined with mostly early twentieth-century, midsize structures (of 2 to 10 stories) with residential and commercial uses. There were also some mid-century modern buildings designed and built the 1960s and early 1970s.

Figure 5-1. 1977 Conditions on 16th Street

Source: RTD, 1977-1979
In the 1970s, city leaders, through federal assistance from the Urban Mass Transportation Administration (UMTA [known after 1991 as the FTA]), sought to disrupt this trend and revitalize the 16th Street corridor through addressing three major concerns: downtown blight, transportation, and noise/air pollution. The 16th Street Mall’s distinctive design and unified concept, pedestrian and transit uses, and electric and diesel-powered bus-fleet addressed these issues, providing a resurgence in the area that was celebrated as a success almost immediately following its opening. The 16th Street Mall sparked not only a noticeable economic boom in the area, the transformed corridor fostered a civic spirit previously diminished by post-World War II transportation and development trends (Denver Partnership, Inc. and DRCOG, 1982).

By the early 1970s, cities across the United States initiated similar urban renewal projects like the 16th Street Mall, renovating under-used and decayed urban spaces with new commercial, pedestrian, civic, and transit purposes (McKnight et. al, 2010). Decorative landscaping, hardscape features, and restricted automobile use were often cornerstones of these projects, typically completed in a Modern-style aesthetic (McKnight et. al, 2010). The Fulton Mall in Fresno, California (completed in 1964) is one of the earliest examples, as are the Portland (Oregon) Transit Mall (completed in 1977), Nicollet Mall in Minneapolis (completed in 1968), and the Chestnut Street Transitway in Philadelphia (completed in 1976) (Judge, 2013). These projects also received federal assistance through agencies like UMTA (McKnight et. al, 2010; Judge, 2013).

During the planning of the 16th Street Mall Project, the Project team was admittedly influenced by the eight-block Nicollet Mall, which had a Modern-inspired design and a public bus component and sought to improve a fledging business district (Denver Partnership, Inc. and DRCOG, 1982). To guide the 16th Street Mall project, designers traveled to Minneapolis and cities with similar projects, to meet with business leaders, transportation experts, and elected officials (Denver Partnership, Inc. and DRCOG, 1982).

Denver leaders, downtown merchants, and the RTD considered numerous plans and solutions to the post-World War II decline of downtown business and recreation, loss of longtime streetcar public transportation once centered on 16th Street, and the simultaneous rise of automobile congestion on Denver’s city streets. Following popular trends but also lessons of what worked and did not work in other cities with similar challenges in the 1960s and 1970s, CCD, business groups such as the 1970s Sixteenth Street Mall Corporation (1973–1974), RTD, and federal planners decided to convert the city’s longtime downtown retail-commercial street to a pedestrian mall with frequent and free transit buses.

By 1977, RTD’s review of design proposals resulted in commissioning the New York architectural firm of I.M. Pei & Partners, teamed with Philadelphia landscape architecture consultant Laurie Olin of Hanna/OLIN and ultimately the Denver landscape architecture firm of Phillip E. Flores Associates, Inc. (RTD, 1977-79; I.M. Pei & Partners, 1977). Paving material is called out in the original planning document as the “single element” that would “establish the character of the mall,” and is one of the primary character-defining features of the Mall (I.M. Pei & Partners, 1977).

As summarized in The Transitway/Mall: A Transportation Project in the Central Business District of Metropolitan Denver, the goals of the project were to “lessen traffic congestion” in downtown Denver, “provide more efficient bus service” to Denver’s downtown and suburban neighborhoods, and to “create a new pedestrian environment in the downtown – a place for people” (I.M. Pei & Partners, 1977).
The design concept took into consideration the existing scale of the street, with its variety of visual elements, buildings sizes and uses, and unique interest of the street. The challenge for the designers was to “create a unifying theme and common identity for the street, while protecting its distinctive personality” (I.M. Pei & Partners, 1977). The designers believed that landscaping, in particular, trees, would create the desired unifying theme as well as provide physical protection from the elements: “The location of trees is crucial” (I.M. Pei & Partners, 1977). Thus, the design placed them in the center, diagonally spaced, 32 feet apart so as not to block accessibility or visibility of the structures lining the mall and to maintain the visibility and unique visual qualities of the exiting street. The sidewalks were widened and considered quasi-private spaces that were essentially adjuncts to the shops lining the street. The transit lanes were physically depressed from the sidewalks, but visually cohesive with the pavement pattern. The designers wanted to define the vehicular lanes for safety reasons, but also to make this definition in the least visually obtrusive way.

With its benches, fountains and other amenities, the design intentionally created a framework and a setting for both present planned uses and for the future. “Ample space is provided for sidewalk cafes, kiosks, vending carts, and displays which can evolve into permanent elements or change as different needs emerge” (I.M. Pei & Partners, 1977).

OLIN and Pei’s principal designer, Henry Cobb, discussed a design approach of Southwestern geometric patterns including Navajo blankets with polychrome diamond motifs. While still discussing the final design, OLIN visited a souvenir shop along 16th Street Mall and encountered trouser belts decorated with diamondback rattlesnake skins. From those inspirations, the architects and landscape architects crafted the Mall’s overall design, precisely interwoven within three shades of granite pavers and unified by the tree plantings, and light standards. Signage, planters, street furniture (e.g., benches and shelters), fountains, banners and other moveable objects (such as mailboxes, phone boxes, and trash receptacles) were part of the overall plan and were given a uniform design and placed along the street in a planned pattern to blend with the rest of the mall’s design features.

The tree selection process was extensive and began with the evaluation of 72 species, based on criteria created by the design team; among them, “height and diameter, trunk, branch, leaf and root form, shade characteristics, sun, water and maintenance needs, disease and insect susceptibility, wind and pollution tolerance, availability and cost” (I.M. Pei & Partners, 1977). Based on their evaluation, the team selected the honey locust for the center blocks and red oak for the ends.

Following general plans and public input throughout the 1970s (Sixteenth Street Mall Corporation, 1973–1974; RTD, 1977–1979), construction began in early 1981 (Figure 5-2) based on the approved 1980 design from the architects/landscape architects team (Historic Denver, Inc., 2012a). Funding of $76 million came from UMTA and RTD, operator of the Mall buses (Marritz, 2014). The project began on the northwestern end at Market Street and proceeded southeast in increments along the entire 80-foot-wide 16th Street right-of-way. The design cross section specified a transit way concrete base sloping to each curb from an apex centered between the transit lanes (I.M. Pei & Partners, 1980).
Subsequent maintenance and replacement of the granite pavers indicated the concrete base was ultimately not built with slopes, or with inadequate slopes and disposition of surface water that permeates into the base through deteriorated paver joints (Harvey, 2015).

Because of the narrow roadway, the placement of the trees into the specially designed, irrigated, and drained concrete root chambers under the Mall surfaces presented challenges, especially when completed and paved to match the continuous pavement of the transit lanes and sidewalks (Historic Denver, Inc., 2012b). Construction concluded with a public dedication attended by 200,000 on October 4, 1982.

Following the Mall’s completion in October 1982 (Figure 5-3), the project won the University of Colorado’s 1983 “Honor Award for Excellence in Urban Design,” the Associated Landscape Contractors of America’s 1984 “Environmental Improvement Award of Distinction” (Historic Denver, Inc., 2012a), and the American Society of Landscape Architects’ 1985 “Professional Award, Design Category” (Cultural Landscape Foundation, 2009). The Urban Land Institute (ULI) in 2008 named the Mall “public art of the highest international quality” (ULI, 2008). Henry Cobb is now a Fellow of the American Institute of Architects; Laurie Olin is a Fellow of the American Society of Landscape Architects and recognized as a “Pioneer” by the Cultural Landscape Foundation (2009).
Figure 5-3. The 16th Street Mall, 1987, Facing Southeast


Originally, the transit way vehicles crossed Broadway and had a turnaround area in the Civic Center between the Concourse Level (lower level) and the Plaza Level (upper level, which lead to the nearby government offices). This turnaround area has since been removed and is not part of the historic property.

RTD separately contracted designs and construction for its Civic Center Transfer Facility (later named Civic Center Station) as the southeastern Mall bus terminal, and the Northwest Transfer Facility (later named Market Street Station) as the northwestern terminal, including Mall bus drop off and turnaround in the block between Market and Blake streets. The Civic Center Station was a part of the I.M. Pei design, but is no longer extant. Following removal of the 16th Street viaduct across the Union Station railyard, RTD and FTA extended the 16th Street transit way from Blake Street to the northern side of Union Station and the new LRT terminal there. After 2010, that transit way and LRT terminal underwent further reconfiguration to their current services north of the intersection of 16th Street and Chestnut Place in the former Union Station railyard. RTD, with FTA assistance, performs continual maintenance on the transit way, including replacing broken granite pavers and special units.
5.2 Historic Properties

Thirty-three historic properties have been identified within the project APE, one of which is the 16th Street Mall itself (Attachment 2, Form 1403). Table 5-1 lists the historic properties and their NRHP status. Attachment 4 contains a map book showing the locations of the historic properties within the APE. Attachment 5 contains an expanded table with additional information on each property.

Table 5-1. Historic Properties within Area of Potential Effects

<table>
<thead>
<tr>
<th>ID No.</th>
<th>Historic Property Name</th>
<th>Address</th>
<th>NRHP Eligibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>5DV.47</td>
<td>Lower Downtown Historic District</td>
<td>Multiple</td>
<td>NRHP-eligible</td>
</tr>
<tr>
<td>5DV.47.15</td>
<td>Waters Building – Market Center</td>
<td>1642 - 1644 Market Street</td>
<td>Contributes to Lower Downtown Historic District</td>
</tr>
<tr>
<td>5DV.47.37</td>
<td>Hitchings Block</td>
<td>1620 Market Street</td>
<td>Contributes to Lower Downtown Historic District</td>
</tr>
<tr>
<td>5DV.47.7</td>
<td>Liebhardt-Linder Building – Market Center</td>
<td>1624 Market Street</td>
<td>Contributes to Lower Downtown Historic District</td>
</tr>
<tr>
<td>5DV.47.96</td>
<td>McCrary Block – Market Center</td>
<td>1628 Market Street</td>
<td>Contributes to Lower Downtown Historic District</td>
</tr>
<tr>
<td>5DV.500</td>
<td>Steel Building; Fontius Building; Sage Building</td>
<td>1555 Welton; 600 16th Street</td>
<td>Listed on NRHP</td>
</tr>
<tr>
<td>5DV.5297</td>
<td>Liebhardt Building; Cottrell Clothing Company</td>
<td>601 16th Street</td>
<td>Listed on NRHP</td>
</tr>
<tr>
<td>5DV.118</td>
<td>Daniels &amp; Fisher Tower</td>
<td>1101 16th Street; 1601 Arapahoe Street</td>
<td>Listed on NRHP</td>
</tr>
<tr>
<td>5DV.135</td>
<td>Denver Dry Goods Company Building</td>
<td>702 16th Street; California Street; and 16th Street</td>
<td>Listed on NRHP</td>
</tr>
<tr>
<td>5DV.136</td>
<td>Masonic Temple Building</td>
<td>1614 Welton Street, 535 16th Street</td>
<td>Listed on NRHP</td>
</tr>
<tr>
<td>5DV.139</td>
<td>Kittredge Building</td>
<td>511 16th Street</td>
<td>Listed on NRHP</td>
</tr>
<tr>
<td>5DV.142</td>
<td>A.C. Foster Building; University Building</td>
<td>910-918 16th Street</td>
<td>Listed on NRHP</td>
</tr>
<tr>
<td>5DV.1913</td>
<td>Joslin Dry Goods Company Building; Tritch Building</td>
<td>934-938 16th Street</td>
<td>Listed on NRHP</td>
</tr>
<tr>
<td>5DV.494</td>
<td>A.T. Lewis and Son Department Store; Holtzman and Appel Block</td>
<td>800-816 16th Street</td>
<td>Listed on NRHP</td>
</tr>
<tr>
<td>5DV.496</td>
<td>Neusteter Building</td>
<td>720-726 16th Street</td>
<td>Listed on NRHP</td>
</tr>
<tr>
<td>ID No.</td>
<td>Historic Property Name</td>
<td>Address</td>
<td>NRHP Eligibility</td>
</tr>
<tr>
<td>----------</td>
<td>------------------------------------------------------------</td>
<td>----------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>5DV.499</td>
<td>McClintock Building</td>
<td>1554 California Street</td>
<td>Listed on NRHP</td>
</tr>
<tr>
<td>5DV.1725</td>
<td>Independence Plaza; Prudential Plaza</td>
<td>1001 16th Street 1050 17th St.</td>
<td>NRHP-eligible</td>
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<tr>
<td>5DV.1760</td>
<td>Bridgepoint Plaza; Park Central</td>
<td>1110 16th Street; 1515 Arapahoe Street; 1111 15th Street</td>
<td>NRHP-eligible</td>
</tr>
<tr>
<td>5DV.1832</td>
<td>Security Life Building; 1600 Glenarm Place</td>
<td>1616 Glenarm Place</td>
<td>NRHP-eligible</td>
</tr>
<tr>
<td>5DV.1854</td>
<td>Hilton Hotel; Radisson Hotel; Adams Mark Hotel</td>
<td>1550 Court Place</td>
<td>NRHP-eligible</td>
</tr>
<tr>
<td>5DV.1856</td>
<td>Dome Tower; Great West Plaza; World Trade Center</td>
<td>1625 Broadway</td>
<td>NRHP-eligible</td>
</tr>
<tr>
<td>5DV.1877</td>
<td>Zeckendorf Plaza; Hyperbolic Paraboloid</td>
<td>350 16th Street; 1550 Court Place</td>
<td>NRHP-eligible</td>
</tr>
<tr>
<td>5DV.1878</td>
<td>Colorado Federal Savings</td>
<td>200 16th Street</td>
<td>NRHP-eligible</td>
</tr>
<tr>
<td>5DV.1880</td>
<td>Petroleum Club Building; Petroleum Building; 110 Building</td>
<td>110 16th Street</td>
<td>NRHP-eligible</td>
</tr>
<tr>
<td>5DV.1914</td>
<td>Federal Reserve</td>
<td>1020 16th Street</td>
<td>NRHP-eligible</td>
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<tr>
<td>5DV.493</td>
<td>Symes Building; F.W. Woolworth Company</td>
<td>820 16th Street</td>
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<tr>
<td>5DV.497</td>
<td>Hayden, Dickinson &amp; Feldhauser Building; Colorado Building</td>
<td>1609-1615 California Street</td>
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<tr>
<td>5DV.5298</td>
<td>Walgreens</td>
<td>801 16th Street</td>
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<td>5DV.7044</td>
<td>16th Street Mall</td>
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<td>5DV.8274</td>
<td>Skyline Park</td>
<td>1500-1800 Arapahoe Street</td>
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<tr>
<td>5DV. 842</td>
<td>16th Street Historic District</td>
<td>Multiple</td>
<td>NRHP-eligible</td>
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<tr>
<td>5.DV.9217.1</td>
<td>Denver Tramway Trolley Lines archaeological site</td>
<td>Broadway</td>
<td>NRHP-eligible</td>
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</table>
5.2.1 16th Street Mall

5.2.1.1 Property Description

The 16th Street Mall historic property includes 16th Street from Broadway at its western line of intersection with 16th Street, from building face to building face for 12.5 blocks, to Market Street at its eastern line of intersection with 16th Street, plus the small triangular block bounded by Broadway, 16th Street, and Cleveland Place. This boundary encompasses the original design limits of the 1980 Transitway/Mall design by I.M. Pei & Partners and Hanna/OLIN landscape architects (OAHP, 2018).

The property is a transit way and pedestrian corridor (Figure 5-4) with three distinct zones: a central zone with a 22-foot-wide median with two parallel rows of trees, and end blocks where the transit lanes are adjacent with two parallel rows of trees on one side. The essential elements of the design, according to the 1977 design concept document, are “paving, planting, and lighting” (I.M. Pei & Partners, 1977).

Figure 5-4. 16th Street Mall

Source: CH2M (Photographed by Sara Orton) February 28, 2018
According to the 1977 design concept (I.M. Pei & Partners, 1977):

...[the] “basic elements of the 16th Street urban design concept include:

- A double row of mature Honey Locust trees flanking a 22-foot wide promenade in the center of the street.
- Two 10-foot-wide transitway paths on either side of the central zone.
- Widened sidewalks along the storefronts.
- Patterned paving over the entire street surface in varying tones of muted grays and red.
- A combination light fixture creating a variety of lighting levels at dusk, during the evening, and for late-night security.
- Shelters, benches, fountains as well as places for displays, sidewalk cafes, and special events.

This basic arrangement is modified on the end blocks of the mall. Here, the transitway paths come together and are flanked by a single row of trees offset to open the street to views of the mountains and the D & F Tower at one end, and the Capitol dome at the other.”

The design, precisely interwoven granite pavers in three colors and unified by the tree plantings and light standards, took into consideration the existing scale of the street. Specifically, designed signage, planters, street furniture (e.g., benches and shelters), fountains, banners and other moveable objects (such as mailboxes, phone boxes, and trash receptacles) were part of the overall plan and were given a uniform design and placed along the street in a planned pattern (OAHP, 2018). **Figures 5-5 and 5-6** show the original cross sections of the end blocks (asymmetrical) and the median blocks (symmetrical), respectively (I. M. Pei & Partners, 1980).

**Figure 5-5. Cross Section, Original Asymmetrical End Blocks**

*Source: I. M. Pei & Partners, 1980*
The design team considered the paving material a critical element of the design in establishing a character of the Mall, consistent for the 12 blocks and ultimately selected granite for the material. As significant to the design as the paving material is the paving pattern; the geometry of the pattern was based on a 45-degree diagonal grid, a reflection of the 45-degree intersection of 16th Street and Broadway and the downtown street system (Figure 5-7). This grid is represented in large and small diamond shapes throughout the pattern and the spatial arrangements of the trees and light standards. It also encourages diagonal movement of pedestrians within the Mall (I.M. Pei & Partners, 1977).

Figure 5-7. Overview of Block Design Used on 16th Street Mall, with Colored Planters

Source: SWCA, Inc. (photographed by James Steely), June 6, 2016
The pattern, which visually progresses via the color, shape and size of the pavers, “begins along the street wall as a field of gray paving block which gradually builds in scale as it reaches the center of the mall. The pattern at the edges is deliberately neutral to avoid competition with the varied dimensions of storefronts and doorways. In the center zone the pattern becomes more colorful and dominant. The adjacent transit paths, depressed three inches, are clearly delineated by tone and pattern” (I.M. Pei & Partners, 1977). The depression today measures between 3 and 4 inches along the length of the Mall.

The original design team went to great lengths to find the most appropriate trees for the Mall. A single species, honey locust (Figures 5-8 and 5-9), was selected for the median blocks and red oaks for the end blocks, in an intentional monoculture design. In 1977, the design team evaluated 72 species using the following criteria, to select appropriate tree species and arrive at the honey locust and red oak (I.M. Pei & Partners, 1977):

- Height and diameter
- Trunk
- Branch form
- Leaf shape
- Root form
- Shade characteristics
- Sun, water and maintenance requirements
- Disease and insect susceptibility
- Wind tolerance
- Pollution tolerance
- Availability
- Cost

Figure 5-8. Honey Locust Trees in Median Blocks

Source: CH2M (Photographed by Sara Orton) June 30, 2017
The design document says the honey locust has a “branch and leaf structure that is light and lacy” and “provides shade,” but also creates “dappled, flickering light on pavement surfaces” (I.M. Pei & Partners, 1977). It was also selected for its long lifespan. I.M. Pei also designed the system of tree boxes into which the trees would be planted (Attachment 6).

The character-defining features of the 16th Street Mall, as identified in the 2018 Form 1403 (OAHP, 2018), are as follows:

- Consistent paving pattern design
- Granite paver units/modules, 1-foot 5-inch by 1-foot 5-inch, in three shades: charcoal gray, light gray, and “Colorado red” (specified as White, Black, and Red on the 1980 plans)
- Granite special units of charcoal and light gray for curbs, cuts, drains, and other applications
- Red oak and honey locust trees planted in specially-designed under-pavement concrete root boxes and ringed at the surface with custom-designed grates
- Custom-designed and -built light standards (Figures 5-10 and 5-11)
- Street furniture of custom-designed and -built fiberglass trash and flower receptacles
- Custom metal street signs on traffic signals (Figure 5-12) and overhead lights
Figure 5-10. Original 16th Street Mall Light Standard

Source: SWCA, Inc. (photographed by James Steely), June 6, 2016

Figure 5-11. Replica Light Standards

Source: CH2M (Photographed by Sara Orton) February 28, 2018
These features are retained on the Mall today. The light standards have been replicated and returned to their original locations and most of the red oaks have not survived, but the majority of the honey locust trees remain or have been replaced. Other alterations include the removal of the Civic Center Transfer Facility at the Broadway end of the Mall. The original I.M. Pei design included this transfer facility, but it was removed prior to the determination of eligibility for the Mall, so it is not within the boundaries of the historic property. The majority of the drinking fountains and telephone stands have been removed, but a few examples remain. In addition, some features of the design were never implemented, such as runway lighting in the transit lanes, waist-high lighted bollards, transit shelters, and transit stop signs.

The design features of the major fountains at Curtis Street and Tremont Place are extant, but the fountains are not used. The 16th Street Mall Fountain Report (Waterline Studios, 2010) notes that the water from the fountains, when in use, comes into contact with humans and animal droppings, but lacks proper filtering and sanitation so the fountains have the potential to transmit water-borne illness. The report identified structural and maintenance concerns: nozzle basin leaks, unreliable water level controls and oversized nozzle pumps, as well as being difficult to properly clean.

5.2.1.2 Statement of Significance
This statement of significance comes directly from Form 1403 (OAHP, 2018), prepared by SWCA, Inc and CH2M.

The 16th Street Mall meets NRHP eligibility Criterion Consideration G, as a property that is identifiable as historically significant at less than 50 years old. The property is eligible for listing in the NRHP under Criterion A at a local level and Criterion C at the state and local level of significance. It’s period of significance is 1980 through 1982, the period of its final design and construction. In meeting the Criterion Consideration G, the original design and construction
elements from 1982 transformed Denver’s downtown streetscape, when the transit way and mall opened, and best represent the exceptional conceptualization of its architects.

**NRHP Criterion A.** The 16th Street Mall is eligible for listing in the NRHP under Criterion A at the local level in the areas of Transportation and Community Planning and Development. The Mall is significant for transforming Denver’s downtown and revitalizing a fledging commercial district affected by post-World War II development outside the city. As Denver-area residents relied more on the automobile, City streets became more congested and polluted, deterring downtown business growth and pedestrian use (Denver Partnership, Inc., et al. 1982). The 16th Street commercial area was in decline by the 1960s and 1970s, caused by population shifts to suburban settings, new trends in retail, and the preeminence of the automobile. Developers started to create large-scale shopping plazas on readily available land near new suburban tracts, reducing the importance and draw of a downtown commercial corridor. By the 1970s, at least 15 shopping centers existed outside downtown Denver. The Public Mall Act was signed into Colorado law in 1970, “allowing municipalities to close off downtown streets” and “in reaction to businesses moving out of downtown areas to suburban indoor malls” (Aspen Historical Society, 2015).

In the 1970s, Denver leaders, through federal financial assistance from the Urban Mass Transportation Administration (UMTA), sought to disrupt this trend and revitalize the 16th Street corridor through addressing three major concerns: downtown blight, transportation, and noise/air pollution (Denver Partnership, Inc., et al. 1982). The 16th Street Mall’s distinctive design and unified concept, pedestrian and transit uses, and electric and diesel-powered bus-fleet addressed these issues, providing a resurgence in the area that was celebrated as a success almost immediately following its opening (Denver Partnership, Inc., et al. 1982). On its emergence in 1982, the Mall sparked not only a noticeable economic boom in the area, the transformed corridor fostered a civic spirit diminished by post-World War II transportation and development trends (Denver Partnership, Inc., et al. 1982). Therefore, the 16th Street Mall has made a significant contribution to Denver’s recent past and is significant under Criterion A at the local level (OAHP, 2018).

When considering this historic context, the Mall has not definitively achieved significance at a national or state level under Criterion A. Its local significance and contributions are evident, but more historical perspective and time is needed to fully understand if it has state or national significance for a resource using Criteria Consideration G. Per NPS guidance, additional scholarly evaluation and historical perspective over time will help the public understand the role properties from the recent past have played at a national level (NPS 2002; NPS 1998). Other properties determined significant under Criterion A at the national level less than 50 years after they were constructed, tend to have broader implications on the history of the United States, associated with major national themes like the United Farm Workers’ movements and Apollo 11 launch. Few pedestrian and/or transit malls developed in the post-World War II context are listed on the NRHP. The notable example is the Lincoln Road Mall, a pedestrian mall constructed in Miami, Florida, ca. 1950 and itself needing revitalization by the late 1960s/early 1970s (Harden 2013), was listed on the NRHP in 2011 (NPS 2011). The Fulton Mall is eligible but not listed on the NRHP. The Nicollet Mall was redeveloped from 2015 to 2017. Although pedestrian and transit malls continue to be developed and redeveloped across the nation, few from that initial era of post-World War II downtown redevelopment remain. A national study found that, by the mid-1980s, “85% of the original 200 U.S. pedestrian malls had been
reopened to traffic” (Judge 2013:3; Harden 2013). South Burdick Street in Kalamazoo, Michigan—credited as being the first pedestrian mall established for downtown redevelopment, in 1959—reopened for vehicle traffic in 1998 (Harden 2013). Comparatively, the Denver Business Journal notes that, for Denver, “closing more than a mile of a downtown street to cars has been an unusual—and much-studied—success” (Harden 2013). As presented by the Denver Business Journal, many of the less enduring pedestrian malls were not as well planned and designed as the 16th Street example (OAHP, 2018).

NRHP Criterion C. Denver’s 16th Street Mall is also significant at the local and state level under NRHP Criterion C in the area of Landscape Architecture, as an award-winning design by master designers, built with granite units in a unique, enduring, western-style pattern consistent along 12.5 blocks. It is also significant under Criterion C in the area of Engineering for its largely hidden but sophisticated matrix of drainage, irrigation, wiring, and “suspended pavement system” that accommodates large and deep root chambers for its 220 shade trees. As noted by Pei’s team in their approach for the project, the designers successfully complemented the existing diversity of buildings and uses along the corridor (Pei, 1977; Pei, 1980). They developed a unifying theme and path of travel for pedestrians and buses that created a defined, new experience in the downtown (Pei, 1977). The scope and design of the project was unique at the time in Denver and Colorado, and its master designers received awards almost immediately following its completion (Historic Denver, Inc., 2012a; Denver Partnership, Inc., et al, 1982). Though constructed less than 50 years ago, it is a unique design and surviving example of Denver’s late twentieth century Modern style-inspired urban renewal efforts. As a result, it is eligible for listing in the NRHP under Criterion C at the state and local level (OAHP, 2018).

Though significant for its design and engineering at the state and local level, the Mall has not yet achieved significance at the national level under Criterion C. As a less than 50-year old property, the Mall represents one of the exceptional works composed by the design team (NPS, 2002; NPS, 1998). NPS guidance advises that time and perspective are needed to understand how properties fit within with the life work and contributions of masters to their field (NPS, 2002; NPS, 1998). Although each of the principal designers is still living, Pei, Cobb, and Olin have had full careers within which to understand the importance of their projects, including the 16th Street Mall. Pei is about 101 years old, Cobb 92, and Olin 80 years old (as of 2018), and Pei and Cobb have important projects that are now over 50 years old and considered historic on that basis. The Mall remains essential in representing their full body of work and is directly recognized as being among the noteworthy projects of these renowned designers (CLF, 2018). The 16th Street Mall is historically important and exceptional within the history of Colorado at the state level as an enduring example of important works by these recognized masters, even though completed less than 50 years ago (OAHP, 2018).

Colorado was where I. M. Pei and his associates, including Henry Cobb, first conducted and completed a project as a fully independent design firm, after splitting from the firm of Webb and Knapp in 1960—where they had begun their careers (Wiseman 2007). They garnered national recognition with development of the National Center for Atmospheric Research building in Boulder 1961 and 1967. In that Colorado design, Pei incorporated Southwestern elements reflective of Mesa Verde cliff dwellings and natural elements intended to incorporate and display aspects of nature while remaining monumental in a Modern style (Wiseman 2007). Distinctive influences from nature and Native Americans of Colorado and the Southwest would again be reflected in the design of the 16th Street Mall. The natural and cultural accents
employed by the Pei team’s architects and landscape architects were in contrast to the starker concrete construction of most Modern design at the time, which has led this unadorned, function-driven construction style to sometimes be called “brutalism” (OAHP, 2018).

While the 16th Street Mall further demonstrates Post-Modern influences, it’s design and concept reflect the earlier Modern examples completed in Philadelphia, Minnesota, and Fresno through federal and local agency involvement. As a Post-Modern structure, the 16th Street Mall incorporates elements of Denver’s Old West in a contemporary interpretation; however, while advancing beyond earlier Modern examples, it has not led to a transformation of the property type throughout the country (ULI, 2008). The 16th Street Mall has not achieved significance at a national level under Criterion C at this point in time (OAHP, 2018).

Criteria Consideration G. Although the 16th Street Mall is not yet 50 years old, it meets NRHP Criteria Consideration G as exceptionally important for its enduring design and for its celebrated role in helping to revitalize downtown Denver at a critical time for the city as it struggled with urban flight, insensitive urban renewal, and the decline of its mining and petroleum image and economy. The property is exceptionally significant at the state and local level due to the project’s role in shaping downtown Denver and embodying a distinctive design by a team of master designers that is unique in the state (OAHP, 2018).

5.2.1.3 Integrity

Portions of the design have been interrupted with subsequent repaving of cross-street intersections through the omission of scoring—called “sawcut joints”—the concrete pavement to match the granite pavers and general diagonal hash-pattern. This scoring was a part of the original design, intended to bridge the design across the opposite running cross streets, but it was not constructed. Some integrity of materials has been lost with ad hoc replacement of granite pavers as they are damaged by vehicular wear or harsh weather (Harvey, 2015). The replacement granite pavers in the transit way between Larimer and Lawrence streets are an example of the large number of pavers replaced in the transit way since its construction in 1982 (Figure 5-13).

Figure 5-13. Paver Replacement in the Mall Transit Way from 2004 to 2014, Larimer to Lawrence Streets

Note: Red areas signify replaced pavers.
Source: RTD, 2015

Some integrity of materials and feeling has been lost through subsequent removal of most of the custom-designed telephone stands and the inactivity of fountains. Some trees have been lost to disease or age, but this has had little overall impact to the setting, feeling, and
association of the Mall. The original turn-around at Civic Center was removed, but the Mall retains integrity of design and workmanship on the remaining 12.5 blocks, even with the loss of that portion of the original design.

The 16th Street Mall retains strong integrity of location, design, materials, workmanship, setting, feeling, and association, and continues to convey its significance under NRHP Criteria A and C, and Criterion Consideration G.

### 5.2.1.4 Skyline Park

The Skyline Park (5DV.8274) is located along Arapahoe Street from 15th Street to 17th Street, parallel to the Mall ([Figure 5-14](#)). It was designed by Lawrence Halpern and constructed in 1973 (its period of significance). It includes green spaces, open spaces, planters, sculptural play areas, and water features ([Figure 5-15](#) contains a photo of the park). Only the portions between 16th Street and 15th Street are currently open to the public. The Daniels and Fisher Tower is within the park boundaries, but was constructed in 1911, prior to the creation of the park.

**Figure 5-14. Map of Skyline Park**
5.2.2 Historic Districts

5.2.2.1 Lower Downtown Historic District

The Lower Downtown Historic District (5DV.47) was formed in 1988 and is significant for its mid- to late-19th century architecture. The period of significance for the district is 1860 through 1941. There are four properties that are contributing elements to the district (5DV.47.7, 5DV.47.15, 5DV.47.37, and 5DV.47.96) that are within the APE (Figure 5-16). These contributing properties are along Market Street at the northeastern edge of the APE. The district boundaries are roughly the alley between Larimer and Market streets, 20th Street, Wynkoop Street in front of Union Station, and two blocks of Wewatta Street to Speer Boulevard (Colorado Historical Fund, 2000) (Figure 5-17 contains a map of boundaries).
Figure 5-16. Market Center in the 1600 Block of Market Street in the Lower Downtown Historic District

Figure 5-17. Lower Downtown Historic District Map
5.2.2.2 16th Street Historic District

The property listed as 5DV.842, the 16th Street Historic District (Figure 1-4), is eligible for listing in the NRHP under Criterion C for its unique collection of architectural styles from various eras in retail/wholesale and commerce themes. Surveyed in 1979, the period of significance for the district is 1889 to 1930, which encompasses the build dates of the 25 contributing buildings (Glassman, 1979; Norgren, 1982). The district’s significance is based in part on “its role in the economic development of Denver for along the street lie many structures that have played important roles in the city's commerce. ...the buildings in the District reflect the historical development of the city and its architectural tradition” (Glassman, 1979).

5.2.2.3 Downtown Denver Historic District

Not listed in Table 5-1 is the Downtown Denver Historic District (5DV.7989), a locally designated landmark, which is a discontiguous district that does not include the Mall but includes some buildings along the Mall between Arapahoe Street and Glenarm Place. The 43 buildings included in the district date from the 1870s to the early 20th century (Denver Infill, 2018). This property is not further discussed or evaluated in this report because it has not been determined eligible for listing in the NRHP and the Mall is not listed as one of the properties within the Downtown Denver Historic District.

5.2.3 Archaeological Resources

There is an identified historic archaeological site partially within the APE: Site 5DV.9217.1, a former tramway line, begins at E. 16th Avenue and Broadway and is within the APE from E. 16th Avenue to Cleveland Place. The entire Denver Tramway Trolley system is eligible for listing in the NRHP under Criterion A and B. It played an important role in early public transit in Denver and facilitated the development of more distant neighborhoods by giving residents a way to travel between work, home, and recreational opportunities. The South Broadway line was the first electrified line to operate in Denver. It continued in operation from December 1889 to June 1950, when South Broadway was paved over for vehicular traffic, and has been buried under the road since that time. There would be no direct or indirect impacts to this resource from the undertaking because it is outside the limits of construction.
Findings of Effect

Section 106 of the NHPA creates a process for reviewing the effects of federal undertakings on properties listed in or eligible for the NRHP. A proposed project would have an effect if it changed the characteristics that qualify the property for inclusion in the NRHP. A proposed project would have an adverse effect on historic properties if it diminished the integrity of those characteristics. The Project team applied the Criteria of Effect to determine whether the proposed Project alternatives would affect the historic properties in the APE and whether those effects should be considered adverse.

6.1 No Build Alternative

The No Build Alternative would not change the current alignment of 16th Street Mall and would not repair or upgrade the belowground utilities and infrastructure. The trees and tree boxes would not be replaced, so the condition of the trees would remain the same and there would be no plan for replacing trees that have died or been removed. Under the No Build Alternative, the granite pavers would continue to be replaced in an ad hoc manner as the need arose or replaced with concrete, asphalt or other materials. Because the underlying existing deteriorating infrastructure would not be updated, safety hazards for pedestrians and vehicles, and the frequent and costly maintenance would continue.

There would be No Adverse Effect on the 16th Street Mall under the No Build Alternative; however, there would be impacts including the loss of trees and the loss of granite pavers, as is currently the case, through repair and replacement.

6.2 Locally Preferred Alternative

The following sections discuss the effects of the LPA on the historic 16th Street Mall and the other historic properties within the APE. There would be no property acquisitions and no direct impacts from the LPA to the identified historic properties within the APE that abut the 16th Street Mall.

6.2.1 16th Street Mall Historic Property

There would be an adverse effect on the 16th Street Mall historic property from implementation of the LPA. Impacts to the Mall would include realignment of the asymmetrical ends, relocation of the transit lanes, conversion of the current median to transit lanes, and replacement of the existing granite pavers with new granite pavers. There would also be impacts to the original design through shifts in some of the tree locations, removal of the specifically designed tree boxes, a change in the number and kinds of tree species, and an additional row of trees added on the asymmetrical ends, increasing the overall number of trees on the Mall.

The key elements of the I.M. Pei-designed landscape are paving, planting, and lighting. Implementation of the LPA would affect each of those elements of the 16th Street Mall historic property.

6-1
6.2.1.1 Character-defining Features

**Paving.** Although the LPA would retain granite pavers in three colors as part of the design, as called for in the original I.M. Pei–Hanna/OLIN design, it would not replicate or preserve the original pattern. The existing pavers would not be reused and the new pavers would have a different surface to improve traction.

The LPA design would shift the paving pattern on the asymmetrical blocks roughly 2 feet to accommodate safety, pedestrians, and other elements of the purpose and need (Attachment 1). This shift would likely not be perceptible to the casual Mall user, but it means none of the pavers would be in exactly the same location as in the current design. Through the LPA design process, this shift has been reduced to accommodate the original design. The design concept of a carpet covering the space between the existing buildings on an intimate scale would be retained. The LPA design is reverential of the original design and uses the same three colors of pavers with grey tones at the buildings moving to larger pavers with more intense colors and greater scale at the center.

The paver pattern on the current median blocks would be retained. In this area, there would be no shift in the carpet pattern, but there would be a change in programming. In the current design, the paving pattern corresponds to uses; a pattern of large diamonds defines the pedestrian promenade and a distinct pattern of medium diamonds defines the transit lanes. A smaller diamond pattern is used in the pedestrian area. The design team considered reconfiguring the paving pattern to correspond the use (such as transit lanes, pedestrian spaces, or patio spaces) with the paver pattern, as in the current design, but the feedback from consulting parties was a preference for retaining the pattern regardless of the programming. Thus, the paver pattern would be retained in the center-running blocks, and the programming on each pattern would change; the transit lanes would run on the larger diamonds and the trees and amenities would be on the surface with the medium sized diamond pattern. Additional markings on the transit lanes to visually clarify the lane locations could be installed so drivers would know recognize the transit lanes on big pattern. Pedestrian walking areas would continue to use the smaller diamond pattern.

The preliminary LPA paver pattern (Attachment 1) retains the 45-degree diagonal grid originally designed as a reflection of the 45-degree intersection of 16th Street and Broadway and the downtown street system. This grid would be retained and would continue to encourage diagonal movement within and across the Mall.

Other changes to the pattern could be required to accommodate federal ADA requirements, local bus loading and unloading requirements, or other unforeseen safety or drainage issues that could arise as the project proceeds. The goal is to retain the pattern geometry, spatial relationships, massing, size, scale, and color where possible, changing these only if it is absolutely necessary to meet functionality, operations, safety, and regulations.

Measures have been taken throughout the design development and consultation process to retain the I.M. Pei–Hanna/OLIN design concepts and philosophies in the proposed paver pattern (Attachment 7) contains the Project team’s Pattern and Geometry Studies). However, the undertaking would alter the paver pattern, the programming of the paver patterns, and the exact locations of the current pavers, and the pavers themselves.
**Planting.** The trees selected by the original design team—honey locust for the median blocks and red oaks for the end blocks—were part of the intentional monoculture design. City regulations and best practices regarding tree species have changed since the 1980s to discourage monoculture plantings, to keep the tree canopy healthy and full and to avoid single species die-offs (as happened with the red oaks).

Tree species will be selected using the historic design criteria, while also meeting current Denver Parks and Recreation Forestry Division requirements and diversity regulations. **Table 6-1** provides a comparison of the criteria used in in 1977 for the original design and in 2018 for the current Project. There are tree spacing and diversity requirements that were not in effect in 1982 that need to be accommodated. To protect the overall downtown canopy and the health of the trees, there are maximum numbers of family, genus, and species that can be planted within a certain area.

**Table 6-1. Historic and Current Tree Criteria Comparison**

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<th>2018 Criteria</th>
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<td>Height and Diameter: 35 feet tall</td>
<td>Ability to create straight trunk with first branching at 20-foot height</td>
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<tr>
<td></td>
<td></td>
<td>Crown spread: 20 to 25 feet for promenade trees, 30 to 35 feet minimum for shade trees</td>
</tr>
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<td>Branch and leaf structure: Lacy and Open</td>
<td>Branch and leaf structure: Lacy and Open</td>
<td></td>
</tr>
<tr>
<td>Shade characteristics: Dappled Shade</td>
<td>Shade characteristics: Dappled Shade</td>
<td>Leaf color:</td>
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<tr>
<td></td>
<td></td>
<td>Yellow fall color for shade trees</td>
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<tr>
<td></td>
<td></td>
<td>Contrast for promenade trees</td>
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<td>Leaf texture</td>
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**Tree Health Elements**

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<td>Drought resistant</td>
</tr>
<tr>
<td>Tolerant to wind and air pollution</td>
<td>Tolerant to wind and air pollution</td>
</tr>
<tr>
<td>Disease and insect resistance</td>
<td>Disease and insect resistance</td>
</tr>
<tr>
<td>Salt tolerant</td>
<td>Salt tolerant</td>
</tr>
<tr>
<td>Tolerant of high pH soils</td>
<td>Tolerant of high pH soils</td>
</tr>
<tr>
<td>Growth Rate: fast to moderate preferred</td>
<td>Growth Rate: fast to moderate preferred</td>
</tr>
</tbody>
</table>
The design team and the CCD City Forester’s office will work closely to meet both the design criteria and the intent of the design criteria, when selecting the tree species (Attachment 8). But it will not be possible to have one species along the center-running blocks and one along the new asymmetrical blocks. This alters the original design by disrupting the intentional selection of just two species.

The original design had 199 trees, while today 143 trees can be found on the Mall. The LPA proposes approximately 250 total trees in the new design. Along the asymmetrical blocks, an additional row of trees would be added between the transit lane and the sidewalk where previously there were no trees. In the original design, the narrow sidewalks on the end blocks did not have any trees, but the designers felt that these sidewalks could be landscaped to “augment the mall greenery without diminishing street vistas” (I.M. Pei & Partners, 1977).

The LPA would also remove the existing, character-defining tree boxes that have a 300-cubic-foot soil capacity and replace them with new, suspended, tree infrastructure that provides 1,000 cubic feet of soil volume, such as a silva cell or equivalent technology. The Pei-designed tree root ball containers would not be retained or replicated. Landscape irrigation would be removed and replaced.

The undertaking would alter the number of tree species, the total number of trees, the precise location of the trees, and the specifically designed tree boxes.

**Lighting.** The existing light standards are replicas of the original design, and the pole light standards under the LPA would replicate this same design. Where the new rows of trees would be added, replica pole light standards would be added, in keeping with the original staggered design of trees and lights.

**Alignment.** The LPA effects the historic alignment of the Mall by repurposing the medians to transit lanes in center-running blocks, which would move the amenity spaces to the outer sidewalks, shortening the width of the transitions at Tremont Place and Arapahoe Street, and discontinuing a single transit lane that runs the length of the Mall without shifting.

The original design concept of three distinct zones with a sense of beginning, middle, and end would be retained, but the distinction between each zone would be lessened. Currently, one transit lane remains on the same alignment between the median and asymmetrical blocks, and one transit lane shifts 16 feet from its location on the median blocks to its location on the asymmetrical blocks. The LPA would result in both transit lanes shifting 4 feet from their location on the median blocks to their location on the asymmetrical blocks. While the locations of the transitions along the linear feature would be retained, the shifts at each transition would be smaller and less distinct.

**Other Features.** Other character-defining features would also be affected by the undertaking. Although final decisions have not been made, it is likely that most of the original street
furnishings would be removed and replaced. The trash receptacles do not meet current safety standards and are difficult to use successfully, particularly for the disabled. Most of the specifically designed drinking fountains and telephone stands have already been removed, as have some of the original benches. Examples of each of the original features could be preserved, but that has not been decided. Some of the round planters could be refurbished and reused in some capacity on the Mall, but the majority would be removed. The same is true for other specifically designed movable structures; examples could be preserved, but most would likely not be retained along the Mall.

The major fountains at Curtis Street and Tremont Place are extant, but are not used because of filtration, safety and maintenance problems. The LPA at this stage of design does not include specific locations or specifications for fountains; although water features are planned to be included in the ultimate design, the existing fountains would not be retained or replicated.

The simple street signs on the traffic signals (Figure 5-12) would be retained. The pianos are not part of the original design, so the ultimate decision regarding their retention would not affect the historic property.

6.2.1.2 Visual Effects

Visual effects on the historic 16th Street Mall would not be distinct from the long-term effects on the character-defining features of the Mall from the LPA.

6.2.1.3 Construction Effects

There would be no additional effects to the 16th Street Mall historic property from construction that have not already been considered in the implementation of the Project.

6.2.1.4 Design Options for Transitway Delineation

Under either design option, additional delineating features that may be considered include visual delineations such as in-pavement lighting or different color materials; a strip of textured surface, detectable to the visually impaired; bollards; or other delineating features that would not impair movement across the Mall. The effects of these type of features on the historic property would be evaluated as they are further studied and would be included in the Section 106 agreement document developed as a part of this undertaking.

The design option to include a vertical curb along the transit way, delineating the transit way from the pedestrian space, is consistent with the original design separating the transit way from the pedestrian space, with the transit way 3 to 4 inches lower than the walkway. These curbs would not be in the same location in which they are currently located.

The design option to have no curb between the transit way and pedestrian space may not result in noticeable visual change to the Mall’s pavement pattern. One of the character-defining features of the Mall is the special units of charcoal and light gray granite pavers for the curbs and curb cuts, so removal of that feature would impact the original design of the historic property. However, charcoal and light gray pavers could be used in the No Curb design option, but they would not vertically separate the transit way from the pedestrian area.
Mitigation Measures
Mitigation measures to address impacts to either design option would not be different; would mitigate the removal or moving of curbs with similar measures; and would mitigate the loss of engineering features in the same way. Measures to mitigate the pattern changes will be the same for each of the design options.

Under either design option, additional delineating features that may be considered include visual delineations such as in-pavement lighting or different color materials; a strip of textured surface, detectable to the visually impaired; bollards; or other delineating features that would not impair movement across the Mall. The effects of these type of features on the historic property would be evaluated as they are further studied and would be included in the Section 106 agreement document developed as a part of this undertaking.

6.2.1.5 Summary
In summary, the undertaking would have an Adverse Effect on the historic 16th Street Mall because of alterations to character-defining features of the property, including the granite pavers, pavement pattern, tree species and locations, tree boxes, additional trees, additional lighting, removal of the median in the center-running blocks, and changes to the alignment. The integrity of materials, design, and workmanship would be lost through these changes. Some association could remain, but the final product, while honoring the original design, would no longer be an I.M. Pei-designed property, and thus would lose its association with I.M. Pei. Olin is on the current design team, so the Mall would retain an association with Olin and would continue to be an Olin-designed landscape; however, it would not be the same designed landscape. The Mall would retain its setting, feeling, and location as the footprint would not change, the surrounding buildings would not change, and it would continue to be a 12.5-block pedestrian and transit way mall.

6.2.1.6 Skyline Park
Skyline Park is outside the period of significance of the Mall historic property and is not a contributing element of the Mall. The park was built in 1973, almost 10 years prior to the conversion of 16th Street to a pedestrian and transit corridor. The park was impacted by that construction and conversion. The Project would not change the setting, feeling, association, or location of the park. The materials, design, and workmanship of the park would not be impacted by the Project on 16th Street. Project elements would be within existing transportation right-of-way and would not require any property acquisitions within the park.

There would be No Adverse Effect on the Skyline Park from the undertaking. The park would continue to be a linear, city park intersecting a pedestrian and transit corridor.

6.2.2 Historic Districts
There would be no property acquisitions from the historic districts that intersect the project corridor. Project elements would be carried out only in the existing transportation right-of-way.

6.2.2.1 Lower Downtown Historic District
The Mall is outside the period of significance of the Lower Downtown Historic District and is not a contributing element of the district. Only a half block of the 16th Street Mall historic property is within the boundaries of the historic district. The alley between Larimer and Market streets is the boundary of the district, so the half block between the alley and Market Street would be
the only area affected by the Project and is a very small portion of the larger district. The
district as a whole would remain intact and retain the key character-defining features that
convey its significance. Project elements would be within existing transportation right-of-way
and would not require any property acquisitions within the district.

The district would retain integrity of setting, feeling, location, association, design,
workmanship, and materials. There would be No Adverse Effect on the Lower Downtown
Historic District from the undertaking.

16th Street Historic District

The Mall is outside the period of significance of the 16th Street Historic District, which was
established prior to the construction of the Mall, which is not a contributing element of the
district. The significance of the district would be retained, and the collection of distinct
architectural styles would not be affected by the Project. The district as a whole would remain
intact and would retain the key character-defining features that convey its significance. Project
elements would only be within existing transportation right-of-way and would not require any
property acquisitions within the district.

The district would retain integrity of setting, feeling, location, association, design,
workmanship, and materials. There would be No Adverse Effect on the 16th Street Historic
District from the undertaking.

6.2.3

Historic Properties adjacent to the Mall

There would be no property acquisition for this Project. The historic properties adjacent to the
Mall are outside the project limits and would not be directly affected by elements of the
project. Attachment 9 comprises a map book showing the historic properties within the APE
and the project limits.

Historic properties dating from the early twentieth century were present when the Mall was
installed in the 1980s and are not from the period of significance of the Mall. The Mall is not
from the period of significance of the majority of the historic properties in the APE. There
would be no new effects on historic properties along the Mall from the LPA beyond those that
occurred from the original Mall construction in the 1980s.

6.2.3.1

Visual Effects

There would be alterations to the viewshed from the historic properties lining the Mall. The
pattern of the granite tiles along the Mall, alignment, tree species, and moveable street
features would change under the LPA. The programming along the Mall is not considered a
character-defining feature, but would also ultimately change, which could change views from
the adjacent historic buildings. The greatest visual effect would be during construction, when
the views from the historic buildings would be of construction materials, rather than
pedestrians and mature trees. The size of the trees would also be a visual alteration; until the
new trees reach maturity, one of the main visual elements of the Mall, the allée of trees, would
be altered.

However, the majority of the historic properties within the APE adjacent to the Mall are early to
mid-twentieth-century buildings and have an earlier period of significance than the Mall. The
visual change to these properties occurred in the 1980s when the Mall was installed, and this
would not present a new affect to the buildings adjacent to the Mall.
6.2.3.2 Noise and Vibration Effects

Based on the FTA criteria, the noise study area was defined as a screening distance of 150 feet from the outside edge of the transit way. Existing noise-sensitive uses (resources) in the noise study area were identified by gathering an inventory of existing land uses. Land uses were organized based on the land use categories identified in the *Transit Noise and Vibration Impact Assessment* manual (FTA, 2006). An inventory of the noise-sensitive resources was collected within the 150-foot screening distance. A total of 33 noise-sensitive land uses are within the 150-foot noise screening distance.

Based on the FTA criteria, the vibration study area was defined as a screening distance of 50 feet from the transit travel lanes. Resources were again organized based on the land use categories identified in the *Transit Noise and Vibration Impact Assessment* manual (FTA, 2006). An inventory of the vibration-sensitive resources was collected within the 50-foot screening distance. Three vibration-sensitive land uses are within the 50-foot vibration screening distance. Details of the analysis are presented in the *Noise and Vibration – Sensitive Land Uses* technical memorandum in Appendix B of the EA.

Under the new asymmetrical sections of the design, the transit way would shift 5 feet away from the building faces on the southern side of the Mall, and 3 feet closer to the building faces on the northern side. Under the center-running section, the transit way would shift 9 feet further from the building faces on both the northern and southern sides of the Mall. The 16th Street Mall has multiple sources of existing ambient noise, including cross street traffic, pedestrians, and businesses. Because the transit way will be shifting away from the buildings in most cases, there would be no increase in noise levels. In places where the transit way shifts 3 feet closer to sensitive resources, it is unlikely that the short distance would noticeably increase the noise levels of the transit way experienced by those sensitive resources. The Free MallRide shuttles are electric, which minimizes the amount of noise they produce. They are so quiet that they use noisemakers to alert pedestrians that buses are coming. The noisemakers would remain under the LPA.

Vibration impacts are unlikely for transportation projects that involve rubber-tired vehicles, except in unusual situations (FTA, 2006). The Free MallRide shuttles have rubber tires, and there are no unusual situations as a part of this project. No substantial roadway surface unevenness (i.e., speed bumps) is proposed, no sensitive manufacturing or research land uses are located within the 50-foot vibration screening distance, and the Free MallRide shuttles do not operate inside or directly underneath any buildings; as a result, no long-term vibration is anticipated. Based on this analysis, there would be no effect on historic properties from noise and vibrations.

6.2.3.3 Construction Effects

Construction impacts identified in the EA would apply to the businesses and residences along the Mall. The setting and feeling of the structures would be temporarily affected during construction of the LPA. Transit service would be shifted or moved off the Mall as described in Section 4 of the EA, pedestrian activity would be reduced, trees would be removed, and the street would be excavated to repair and replace the infrastructure. These effects would no longer exist following completion of the construction.
The current location, setting, feeling and association of these buildings would not be altered by
the LPA, as it will continue to be a transit and pedestrian corridor with two lanes of public
transit, parallel rows of trees and pole lighting, and pedestrian walkways directly adjacent to
the structures. The conversion of the median to transit lanes would not affect the historic
significance of the structures. The basic form, massing, use, and general appearance of the Mall
would remain unchanged; therefore, there would be no visual or atmospheric changes to the
historic properties. Because there would be no direct impacts, the design, materials, and
workmanship of the historic structures would not be affected by the LPA.

In summary, there would be No Adverse Effect on the historic properties within the APE
adjacent to the Mall from the LPA because:

- There would be no property acquisitions
- There would be no direct effects
- These historic properties were affected in the 1980s when the Mall was installed
- The project limits do not cross property lines
- Construction would be outside property boundaries
- No visual or atmospheric changes to the historic properties
- Properties would retain integrity of design, materials, workmanship, location, setting,
  feeling and association

The LPA would also have No Adverse Effect on the Lower Downtown Historic District
(Section 6.2.2.1) and the Skyline Park (Section 6.2.2.2), which intersect the Project.

6.2.4 Archaeological Resources

Site 5DV.9217.1, a former tramway line, begins at E. 16th Avenue and Broadway and is within
the APE from E. 16th Avenue to Cleveland Place, but is outside the Project limits. In 1950, South
Broadway was paved over for vehicular traffic, so the site has been buried under the roadway
since that time. There would be no direct or indirect impacts to this resource from the
undertaking because it is outside the limits of construction. For archaeological resources, there
would be No Historic Property Affected.

No previously recorded significant archaeological resources have been identified within the
Project limits. The Project footprint was previously disturbed during the construction of the Mall,
making it unlikely that resources would be discovered during construction; however, as with any
subsurface construction activities, there is the potential for the discovery of unidentified
archaeological resources.

An Unanticipated Discovery Plan will be developed, and if previously unidentified
archaeological resources are identified during Project construction, all surface- and
subsurface-disturbing activities shall cease in the immediate area of the discovery and the
procedures outlined in the project’s Unanticipated Discovery Plan will be implemented. If
previously unidentified archaeological sites are determined to be eligible for listing in the NRHP,
appropriate mitigation measures would be developed in consultation with SHPO, in accordance
with the plan. The development of the Unanticipated Discovery Plan will be included as a
stipulation in the MOA.
6.2.5 Cumulative Effects

There would be an Adverse Effect on historic properties from this undertaking. Culturally significant structures along the Mall have been demolished or otherwise lost since the 1970s, and there has been some infill along the Mall that complements neither the period of significance of the Mall nor the early and mid-twentieth-century buildings along the Mall. There have also been beneficial effects on historic properties, including the preservation and redevelopment of the Denver Union Station and the implementation of design guidelines for the Lower Downtown Historic District to preserve the historic buildings and the historic character of the district. The effects from this Project would contribute to the cumulative impact to cultural resources in the APE. However, it would not be a significant contribution because 16th Street will remain a pedestrian and transit corridor and because of the minimization measures taken, such as using granite pavers, retaining trees in the design, retaining the beginning, middle, and end alignment and replicating the original pole lighting.

6.3 Summary

Table 6-2 summarizes the findings of effect on each of the historic properties within the APE.

<table>
<thead>
<tr>
<th>Historic Property Name</th>
<th>Address</th>
<th>NRHP Eligibility</th>
<th>Finding of Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waters Building – Market Center</td>
<td>1642 - 1644 Market Street</td>
<td>District Contributor</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Hitchings Block</td>
<td>1620 Market Street</td>
<td>District Contributor</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Liebhardt-Linder Building – Market Center</td>
<td>1624 Market Street</td>
<td>District Contributor</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>McCrary Block – Market Center</td>
<td>1628 Market Street</td>
<td>District Contributor</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Steel Building; Fontius Building; Sage Building</td>
<td>1555 Welton; 600 16th Street</td>
<td>District Contributor</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Liebhardt Building; Cottrell Clothing Company</td>
<td>601 16th Street</td>
<td>District Contributor</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Daniels &amp; Fisher Tower</td>
<td>1101 16th Street; 1601 Arapahoe Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Denver Dry Goods Company Building</td>
<td>702 16th Street; California Street; and 16th Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Masonic Temple Building</td>
<td>1614 Welton Street, 535 16th Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Kittredge Building</td>
<td>511 16th Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>
# SECTION 6 – FINDINGS OF EFFECT

<table>
<thead>
<tr>
<th>Historic Property Name</th>
<th>Address</th>
<th>NRHP Eligibility</th>
<th>Finding of Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.C. Foster Building; University Building</td>
<td>910-918 16th Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Joslin Dry Goods Company Building; Tritch Building; Savoy Grille</td>
<td>934-938 16th Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>A.T. Lewis and Son Department Store; Holtzman and Appel Block</td>
<td>800-816 16th Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Neusteter Building</td>
<td>720-726 16th Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>McClintock Building</td>
<td>1554 California Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Independence Plaza; Prudential Plaza</td>
<td>1001 16th Street 1050 17th St.</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Bridgepoint Plaza; Park Central</td>
<td>1110 16th Street; 1515 Arapahoe Street</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Security Life Building; 1600 Glenarm Place</td>
<td>1616 Glenarm Place</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Hilton Hotel; Radisson Hotel; Adams Mark Hotel</td>
<td>1550 Court Place</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Dome Tower; Great West Plaza; World Trade Center</td>
<td>1625 Broadway</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Zeckendorf Plaza; May D &amp; F Plaza; Hyperbolic Paraboloid</td>
<td>350 16th Street; 1550 Court Place</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Colorado Federal Savings</td>
<td>200 16th Street</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Petroleum Club Building; Petroleum Building; 110 Building</td>
<td>110 16th Street</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Federal Reserve</td>
<td>1020 16th Street</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Lower Downtown Denver Historic District</td>
<td>Multiple</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Symes Building; F.W. Woolworth Company</td>
<td>820 16th Street</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Hayden, Dickinson &amp; Feldhauser Building; Colorado Building</td>
<td>1609-1615 California Street</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Madison Hotel; Harris Hotel</td>
<td>1544-1546 Cleveland Place</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Walgreens</td>
<td>801 16th Street</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>16th Street Mall</td>
<td>1-1300 16th Street</td>
<td>NRHP-eligible</td>
<td>Adverse Effect</td>
</tr>
</tbody>
</table>

<sup>a</sup> Adverse Effect
## Findings of Effect

<table>
<thead>
<tr>
<th>Historic Property Name</th>
<th>Address</th>
<th>NRHP Eligibility</th>
<th>Finding of Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skyline Park</td>
<td>1500-1800 Arapahoe Street</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>16th Street Historic District</td>
<td>Multiple</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>Denver Tramway Trolley Lines archaeological site</td>
<td>Broadway</td>
<td>NRHP-eligible</td>
<td>No Historic Property Affected</td>
</tr>
</tbody>
</table>

<sup>a</sup> No property acquisition; no direct effects; Project limits do not cross property lines; construction would be outside property boundaries; no visual or atmospheric changes to the historic properties; properties would retain integrity of design, materials, workmanship, location, setting, feeling and association.

In summary, the undertaking would have an Adverse Effect on the 16th Street Mall historic property because of alterations to character-defining features of the property, including the granite pavers, pavement pattern, tree species and locations, tree boxes, additional trees, additional lighting, removal of the median in the center-running blocks, and changes to the alignment. The undertaking would have No Adverse Effect on the remaining historic properties in the APE.

Therefore, the undertaking would have an **Adverse Effect** on historic properties under Section 106 of the NHPA.
Avoidance, Minimization, and Mitigation

7.1 Avoidance

In accordance with 36 CFR 800.1(a) and (c), and from early in Project planning, the Project team and agencies have sought ways to avoid, minimize or mitigate adverse effects on historic properties. No alternative that meets the purpose and need was identified that would avoid an Adverse Effect on the 16th Street Mall historic property. One other build alternative (the Center Running Alternative) would meet purpose and need but, like the LPA, would result in an adverse effect to the 16th Street Mall under Section 106.

The Project evaluated several potential alternatives that would avoid the 16th Street Mall historic property. However, none were feasible or prudent because they either could not be built under sound engineering judgment or did not meet the Project’s purpose and need.

7.1.1 No Build Alternative

The No Build Alternative would maintain the existing alignment and configuration of the Mall. Maintenance activities, such as repairs to the pavement system and other infrastructure, would continue as they do now, and there would be continued implementation of safety strategies, including the 2016 DDP Downtown Security Action Plan.

The No Build Alternative would not be feasible because there is a construction flaw in the design of the pavement drainage system that causes ongoing maintenance and repair activities that disrupt transit operations and are increasingly costly.

The No Build Alternative would not act to address the Project’s stated purpose and need. This alternative would also not include any actions to address the identified safety concerns.

The No Build Alternative would avoid an adverse effect on the 16th Street Mall, but would not address the deteriorating infrastructure, provide equitable and sufficient space for high-quality public gathering opportunities, or improve pedestrian and vehicle safety.

7.1.2 Rebuild in Existing Configuration Alternative

The Rebuild in Existing Configuration Alternative would include the following elements, described further in the Alternative Screening technical memorandum in Appendix B of the EA:

• Reconstruct the Mall in the exact same design as the existing Mall, replicating the existing spatial configurations of the trees, light fixtures, transit lanes, and pedestrian areas.
• Fully comply with ADA standards, which could result in minor changes to the original Mall design being replicated.
• Replace the Mall’s pavement system with a new concrete sub-slab that drains properly
• Replace the existing granite pavers with new granite pavers.
• Replace underground infrastructure and trees.
• Continue operation of the Free MallRide at RTD’s current and planned levels of service.
FTA has determined that the Rebuild in Existing Configuration Alternative could be built as a matter of sound engineering judgment and would be feasible from an engineering perspective. The alternative would address the need to improve deteriorating infrastructure and reduce maintenance frequency and costs to businesses and taxpayers. However, it would not meet the following Project needs:

- **Improve safety for pedestrians and vehicles.** The Rebuild in Existing Condition Alternative would reconstruct the Mall in the same physical configuration as its current design, which would not address safety problems related to the physical design of the Mall. The Rebuild in Existing Configuration Alternative would result in continued safety issues related to the need for better delineation between pedestrian walkways and transit lanes.

- The Rebuild in Existing Configuration Alternative would continue to lack consistent visual delineation between pedestrian walking areas and transit lanes, and the attached sidewalk configuration does not conform with national guidance specific to pedestrian safety. This design would perpetuate the existing condition where pedestrians intentionally (because of sidewalk crowding) or accidentally (because of the lack of clear delineation) walk into the transit lanes or close enough to the transit lanes to be hit by bus mirrors.

- **Maintain mobility for desired transit operations and for all users.** The Rebuild in Existing Configuration Alternative would continue the use of undersized sidewalks. The 8-foot pedestrian walking areas do not meet CCD design standards for 10-foot unobstructed sidewalk width downtown (CCD, 1993) and do not accommodate pedestrian volumes, which currently reach up to 4,100 pedestrians per hour at the east end of the Mall between Champa Street and Glenarm Place. At bus stops, the carrying capacity of the 8-foot walking areas is reduced because people gathering at bus stops obstruct the pedestrian walkway as a result of its location immediately adjacent to the transit lanes.

- **Increase opportunities for public use of the Mall as an iconic civic space for leisure, commerce, and tourism.** The Rebuild in Existing Configuration Alternative would continue to have narrow and divided public spaces on the Mall, perpetuating the limited usability of the Mall for safe and engaging public use and amenities. The physical design of the medians would remain too small for comfortable public gathering. The outer sidewalks on the median blocks, and on the narrow sides of the asymmetrical blocks, would remain too small to allow for both a standard 10-foot pedestrian walking area and a 9-foot patio and amenity space.

### 7.1.3 Partial Repair Alternative

The Partial Repair Alternative is based on the recommendations of the 16th Street Urban Design Plan (BID et al., 2010). This alternative would retain the existing Mall design and would include the following infrastructure actions:

- Renovate existing granite paver system in some areas, but not replace the existing concrete sub-base slab. This alternative would be implemented by reusing the existing granite pavers. In the transit lanes, the process would include cataloging the existing pattern, removing the existing pavers, cleaning and refinishing the pavers, and then resetting the pavers in their original location. In the pedestrian areas, the pavers would not be removed, but they would be refinshed.
• Upgrade surface utilities, including power outlets, where needed.
• Replace failing trees.
• Retain existing tree box infrastructure.
• Renovate and reconfigure furnishings to support public use, pedestrian circulation, and ADA compliance in pedestrian areas.
• Renovate and repair water features including fountains and irrigation.

FTA has determined that the Partial Repair Alternative would not address the construction flaw in the design of the pavement drainage system, which causes ongoing maintenance and repair that disrupt transit operations and are increasingly costly.

The Partial Repair Alternative would not address the other Project needs for the same reasons stated for the Rebuild in Existing Configuration Alternative, compromising the Project to a degree that is unreasonable to proceed in light of the Project’s stated purpose and need.

7.1.4 Reduce Transit Service on Mall Alternative

This concept would entail the continued operation of the Free MallRide at a reduced service frequency to improve safety and reduce pedestrian conflicts with transit service and reduce the barrier effect of transit service on the medians. To meet transit demand, RTD would need to accommodate the ridership affected by the reduced service on either a new parallel service or on the Free MetroRide on 18th and 19th streets.

The Reduce Transit Service on the Mall Alternative could not be implemented as a matter of sound traffic engineering judgement because RTD cannot meet its service requirements and ridership demand through service in mixed traffic on parallel city streets. The Free MallRide shuttle was originally designed as a free transit shuttle bus between Denver Union Station and Civic Center Station, the major transfer stations in metro Denver. Placing the transit service on the Mall decreased the number of buses on downtown streets by funneling express and regional commuter buses to bus terminals. Today, routes along the Mall eliminate approximately 870 bus trips on downtown streets, reducing congestion in the downtown area. Current Free MallRide ridership is approximately 39,000 and is projected to increase to 70,000 in 2035. Reducing service on the Mall would require shifting a portion of the current ridership and all projected ridership to another bus route. Providing bus service in mixed traffic, such as the Free MetroRide currently operating on 18th and 19th streets, provides a slower trip and out-of-direction travel, and would not be able to accommodate RTD’s current and projected ridership demands.

The Reduce Transit Service on Mall Alternative would not address the following Project needs:
• Address deteriorating infrastructure to allow reasonable maintenance frequency and costs to businesses and taxpayers. This alternative would not fully address the failing and deteriorating infrastructure on the Mall and would not fix the flawed pavement system that does not drain water, resulting in the need to reconstruct or replace the infrastructure at a future point in time. Existing and ongoing maintenance problems would continue.
• Improve safety for pedestrians and vehicles. Fewer buses would travel in the transit way, reducing the potential for pedestrian/transit conflicts from existing conditions. However, this alternative would result in the continued safety issue associated with poor delineation between undersized pedestrian walks immediately adjacent to transit lanes.
• **Maintain mobility for desired transit operations and for all users.** The Reduce Transit Service on Mall Alternative would decrease mobility by reducing transit service on the Mall. Parallel routes do not have the capacity to accommodate the transit demand and do not provide equivalent travel times because of longer routes, buses operating in mixed traffic, and out-of-direction travel for riders to reach bus service on parallel streets. Pedestrian walking areas would remain undersized.

• **Increase opportunities for public use of mall.** The reduced transit service would reduce somewhat the barrier effect of transit service on the medians, but the medians would remain too narrow to provide both adequate and comfortable gathering spaces and pedestrian circulation around the gathering space in between the transit lanes.

The outer sidewalks on the median blocks and the narrow sidewalks on the asymmetrical blocks would remain too narrow for both a standard 10-foot pedestrian walking area and a 9-foot patio.

### 7.2 Minimization

#### 7.2.1 Measures to Minimize Effects on Archeological Resources

There are no identified significant archaeological resources within the limits of construction. However, an Unanticipated Discovery Plan will be developed, and if previously unidentified archeological resources are identified during Project construction, all surface- and subsurface-disturbing activities shall cease in the immediate area of the discovery and the procedures outlined in the project’s Unanticipated Discovery Plan will be implemented. If previously unidentified archeological sites are determined to be eligible for listing in the NRHP, appropriate mitigation measures would be developed in consultation with the SHPO.

#### 7.2.2 Measures to Minimize Effects on Cultural Landscape and Built Environment Resources

Throughout the design process, the design team has recognized the importance of the 16th Street Mall to the historic community and to the city. Efforts have been made to reduce impacts to the historic property while still meeting the purpose and need of the Project. The following are ways in which the LPA had reduced effects to the character-defining features of the 16th Street Mall:

- Retain a granite paver surface in the same three colors as the original design.
- Maintain overall design concept of a carpet covering the Mall surface, by retaining a full 80-foot-wide patterned carpet from building face to building face.
- Retain the 45-degree diagonal grid pattern.
- Retain the existing locations of shifts in transit lane alignment in keeping with the beginning, middle, and end in the original design.
- Maintain spatial relationship between trees and light standards.
- Retain permeability of pedestrians throughout each block.
- Minor changes to the overall pattern of the granite pavers from existing design.
• Retain a single row of aligned trees for 12.5 blocks.
• Replicated historic light fixtures would continue to be used in current and new locations.
• Retain street signs on traffic signals.

Although minimization measures have been included in the design of the LPA, the project would have an Adverse Effect under Section 106 of the NHPA on the 16th Street Mall historic property. The property would retain its integrity of location, setting, and feeling, as it would remain in the same location, the structures around it would not change, and it would continue to serve as a transit and pedestrian corridor. The integrity of materials would be impacted by the replacement of the granite pavers, the removal and replacement of the trees, and the change in tree species. The integrity of design and workmanship would not be retained because of the transit way realignments, conversion of the median to transit lanes, shifts in the carpet pattern, and additional trees on the asymmetrical ends. The I.M Pei-design would not be replicated, but the LPA is reverential to the original design in the geometry of the pattern, Navajo rug influence, tree and light spatial arrangement, granite pavers, and three distinct zones. However, the integrity of association would be lost.

7.3 Mitigation

Mitigation is required when project activities directly or indirectly cause adverse effects to historic properties. Throughout the design process for the proposed project, care has been taken to avoid and minimize effects on historic properties, where possible.

Appropriate mitigation measures to address the adverse effect will be established through the Section 106 consultation process between FTA, RTD, SHPO, and the consulting parties, which is ongoing. Mitigation measures will be stipulated in a binding agreement document signed by the entities with responsibilities under the agreement.

Table 7-1 summarizes the LPA’s effects on historic properties, as well as its appropriate mitigation.

<table>
<thead>
<tr>
<th>Effects</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adverse Effect to the 16th Street Mall historic property. Effects would include realignment of the asymmetrical blocks, relocation of the transit lanes, conversion of the median to transit lanes, replacement and relocation of trees, introduction of additional tree species, and replacement of the existing granite pavers with new granite pavers. Visual effects on historic properties adjacent to the APE. The setting and feeling of the historic properties would be temporarily affected during construction of the LPA.</td>
<td>Appropriate mitigation measures to address the adverse effect will be established through Section 106 consultation, which is ongoing, between the lead federal agency and consulting parties. Mitigation measures will be stipulated in a binding agreement document signed by the entities with responsibilities under the agreement. An Unanticipated Discovery Plan will be developed for archaeological resources.</td>
</tr>
</tbody>
</table>
Conclusion

The undertaking would have an adverse effect on the 16th Street Mall historic property because of alternations to the pavement pattern, granite pavers, tree species and locations, tree boxes, as well as additional trees and lighting, removal of the median in the center-running blocks, and changes to the alignment. The undertaking would have No Adverse Effect on the remaining historic properties within the APE.

Therefore, the undertaking would have an **Adverse Effect** on historic properties under Section 106 of the NHPA.

Through Section 106 consultation, which is ongoing, an agreement document will be developed to address the adverse effect on historic properties from the LPA. Appropriate mitigation measures to address the adverse effect will be codified in the agreement document. The legally-binding agreement document will be executed and included with the final NEPA project agreement document.
Bibliography


City and County of Denver, Regional Transportation District, Colorado Department of Transportation, Downtown Denver Business Improvement District, and Denver Regional Council of Governments (CCD et al.). 2005. *Downtown Multimodal Access Plan*.


City and County of Denver (CCD). 2017b. 2017 GO Bond – Mayor Recommended Package of Investments.


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Regional Transportation District (RTD). 2017a. RTD Free MallRide Service Plans and Ridership.

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Waterline Studios. 2010. *16th Street Mall Fountain Report*.


Attachment 1
Locally Preferred Alternative Preliminary Design
COLORADO CULTURAL RESOURCE SURVEY

Architectural Inventory Form

I. IDENTIFICATION

1. Resource number: 5DV7044

2. Temporary resource number: 

3. County: Denver

4. City: Denver

5. Historic building name: 16th Street Transitway / Mall (Structure - Designed Landscape)

6. Current building name: 16th Street Mall (Structure - Designed Landscape)

7. Building address: Broadway northwest to Market Street, 80202

8. Owner name and address: City/County of Denver: Department of Public Works, 201 West Colfax Avenue, Denver, Colorado 80202

II. GEOGRAPHIC INFORMATION

9. P.M. 6th Township 3S Range 68W

   ¼ of NE ¼ of SE ¼ of NE ¼ of Section 34

   ¼ of SW ¼ of SW ¼ of NW ¼ of Section 34

   ¼ of NE ¼ of NW ¼ of SW ¼ of Section 34

   ¼ of SW ¼ of NE ¼ of SW ¼ of Section 34

   ¼ of NE ¼ of SE ¼ of SW ¼ of Section 34

10. UTM reference (center point of structure)

    Zone 1 3 5 0 0 4 2 mE 4 3 9 9 5 9 4 mN

11. USGS quad name: Englewood, CO Year: 1980 Map scale: 7.5 feet X 15.0 feet

12. Lot(s): Block:

    Addition: Year of Addition:

13. Boundary Description and Justification:

    Description: Full width of 16th Street (from the adjacent building faces lining the northeast side to building faces lining the southwest side, typically 80 feet wide) from Broadway at its west line of intersection with 16th Street, northwest 12 blocks to Market Street at its southeast line of intersection with 16th Street (approximately 4,675 ft or 0.9 miles), plus the small triangular block bounded by Broadway, 16th Street, and Cleveland Place.

    Justification: This boundary encompasses the original design limits of the 1980 transitway and mall design by I.M. Pei & Partners, and Hanna/Olin landscape architects, from which mall construction proceeded.
III. Architectural Description (Structural Description)

14. Building plan (footprint, shape): Rectangular (Denver Street Right-of-Way, including sidewalks)

15. Dimensions in feet: Length 4,675 feet x Width 80 feet

16. Number of stories: N/A

17. Primary external wall material(s): Granite paver units in two shades of gray, and one shade of red.

18. Roof configuration: N/A

19. Primary external roof material: N/A

20. Special features: Paver pattern, ornamentation

21. General architectural description: Designed landscape/streetscape and transit mall. This property is a 12-block, 80-foot-wide transitway and pedestrian corridor with three distinct zones, a central zone with a 22-foot-wide median with 2 parallel rows of trees, and end blocks where the transit lanes are adjacent with a single row of parallel trees. The essential elements of the design, according to the 1977 design concept document, are “paving, planting, and lighting” (Pei, 1977) (described in greater detail in Section 35). Key elements were finalized in 1980 design drawings, prior to mall construction in 1981. The intricate patterning of the pavers and the paving material were used by the designers to establish the character of the mall. The geometry of the pattern, based on the city’s existing street system and corresponding to 16th Street’s 45-degree angle where it meets Broadway, is a 45-degree diagonal grid, which was intended to encourage diagonal pedestrian movement along the mall. The pattern “begins along the street wall as a field of gray paving block which gradually builds in scale as it reaches the center of the mall. The pattern at the edges is deliberately neutral to avoid competition with the varied dimensions of the storefronts and doorways. In the center zone, the pattern becomes more colorful and dominant” (Pei, 1977). The pavement design is carried along the length of the mall by polychrome granite units, generally 1-foot 5-inch by 1-foot 5-inch square granite pavers—charcoal gray, light gray, and “Colorado red” (Cultural Landscape Foundation [CLF] 2009)—with special curb, ramp, drain, circular, and other units from the same granite color palette. The streetscape also features custom-designed and custom-built light fixtures, signage, telephone stands, planter and trash receptacles, drinking fountains, and pavement fountains. Consistent tree plantings of 220 oaks and honey locusts are rooted in special underground structural-concrete chambers, 5 feet 5 inches deep, supported by a “suspended pavement system,” with custom tree gratings at the pavement plane (Marritz 2014).

Architectural style/building type: Modern Movement (See Section 42)

22. Landscaping or special setting features: See Sections 17, 21, 42

23. Associated buildings, features, or objects: The flanking block faces of buildings, and their evolution throughout the function of the transitway and mall after 1980, were accommodated with the landscape/streetscape design, but are not part of the structure. The project incorporated and redesigned the triangular block hosting “United Nations Square” at Cleveland Place and Broadway.
IV. ARCHITECTURAL HISTORY

25. Date of Construction: Estimate: _______ Actual: 1982 (original); 1992 (extension from Blake Street to Union Station, later modified northeast of Wynkoop Street, not part of this evaluation)


27. Builder/Contractor: J.A. Walker Company, Denver

28. Original owner: City/County of Denver; same as existing owner
   Source of information: City/County of Denver

29. Construction history (include description and dates of major additions, alterations, or demolitions):
   Following general plans and public input throughout the 1970s (Sixteenth Street Mall Corporation 1973–1974; Regional Transportation District [RTD] 1977–1979), construction began in early 1981 based on the approved 1980 design from the architects/landscape architects team (Historic Denver, Inc. 2012a). Funding of $76 million came from the Urban Mass Transit Administration (UMTA, after 1991 the Federal Transit Administration [FTA]) and RTD, operator of the mall buses (Marritz 2014). The project began on the northeast end at Market Street and proceeded southeast in increments along the entire 80-foot-wide 16th Street right-of-way. The design cross section specified a transitway concrete base sloping to each curb from an apex centered between the transit lanes (Pei & Partners 1980). Subsequent maintenance and replacement of the granite pavers indicates this concrete base was not originally built with slopes, or was built with inadequate slopes, resulting in surface water run-off permeating into the base as paver joints deteriorate (Harvey 2015).

   Oral histories of workers and designers (Historic Denver, Inc. 2012b) described how pedestrian passage, business access, and as much vehicular traffic as possible continued during construction. The contractor encountered and re-located, or moved deeper, several uncharted steam pipes and water mains as construction progressed. Tree placement in specially designed, irrigated, and drained concrete root chambers under the mall surfaces presented challenges, especially when completed and paved to match the continuous pavement of the transit lanes and sidewalks (Historic Denver, Inc. 2012b). Construction concluded with a public dedication attended by 200,000 on October 4, 1982. Design and construction issues, which resulted in separation of the granite pavers from the joint mortar causing the pavers to sink into the setting bed space, were noted subsequent to opening. A civil suit was filed (RTD, et al v. Weaver, et al, Civil Action No. 83-CV-8819) as a result of paver failure on the transitway. The settlement agreement was filed on September 29, 1986 that released the litigants from future liability and awarded RTD a total amount of $4.07 million to be dispersed over a period of 25 years.
RTD separately contracted designs and construction for its Civic Center Transfer Facility (later named Civic Center Station) as the southeastern mall-bus terminal, and the Northwest Transfer Facility (later named Market Street Station) as the northwestern terminal including mall-bus drop off and turnaround in the block between Market and Blake Streets. In 1992, following removal of the 16th Street viaduct across the Union Station railyard, RTD and FTA extended the 16th Street Transitway and Mall from Blake Street to the north side of Union Station and the new Light-Rail terminal there. After 2010, that Transitway and Mall and Light-Rail terminal underwent further reconfiguration to their current services north of the intersection of 16th Street and Chestnut Place in the former Union Station railyard. RTD performs continual maintenance, including with FTA assistance, on the Transitway, such as replacing broken granite pavers and special units. The City/County of Denver has subsequently rebuilt most cross-streets; however, the scored concrete intersection surfaces between block lengths were never built as planned per the original 1980 Pei/Olin 16th Street Transitway and Mall design. Constructed based on the original designs was a bus turn-around at the Civic Center Station, which has since been removed. Originally, the transitway vehicles crossed Broadway and had a turnaround area in the Civic Center between the Concourse Level (lower level) and the Plaza Level (upper level which lead to the nearby government offices.

30. Original location Yes Moved ___ Date of move(s):

V. HISTORICAL ASSOCIATIONS

31. Original use(s): Government, Public Works; Landscape, Street Furniture/Object; Transportation, Road-Related (vehicular)

32. Intermediate use(s): Same as original.

33. Current use(s): Same as original

34. Site type(s): Structure (Designed Landscape)

35. Historical background: Denver leaders, downtown merchants, and the RTD considered numerous plans and solutions to the post-World War II decline of downtown business and recreation; the loss of longtime streetcar public transportation that once centered on 16th Street; and the simultaneous rise of automobile congestion on Denver’s city streets. Following popular trends along with lessons of what worked and did not work in other cities with similar challenges in the 1960s and 1970s, the City/County of Denver, business groups such as the 1970s Sixteenth Street Mall Corporation (1973–1974), and RTD, supported by federal funding, decided to convert the city’s longtime downtown retail-commercial street to a pedestrian mall with frequent and free transit buses. By 1977 RTD’s review of design proposals resulted in commissioning the New York architectural firm of I. M. Pei & Partners teamed with Philadelphia landscape architecture consultant Laurie Olin of Hanna/Olin, and ultimately the Denver landscape architecture firm of Phillip E. Flores Associates, Inc. (RTD 1977; Pei & Partners 1977).

As summarized in the 1977 *The Transitway Mall* design concept document, the goals of the project were to “lessen traffic congestion” in downtown Denver, “provide more efficient bus service” to Denver’s downtown and suburban neighborhoods, and to “create a new pedestrian environment in the downtown
– a place for people” (Pei & Partners 1977). The basic, over-arching design elements on which the design was based were: “a double row of Honey Locust trees flanking a 22-foot wide promenade in the center of the street; two 10-foot wide transitway paths on either side of the central zone; widened sidewalks along the storefronts; patterned paving over the entire street surface in varying tones of muted grays and red; a combination light fixtures creating a variety of lighting levels at dusk, during the evening, and for late-night security; and shelters, benches, fountains, as well as places for displays, sidewalk cafes, and special events” (Pei & Partners 1977). The end blocks are modified so the transitway lanes are together, “and are flanked by a single row of trees, originally red oak, offset to open the street to views of the mountains and the D & F Tower at one end, and the Capitol dome at the other” (Pei & Partners 1977).

The designers believed that landscaping, in particular, trees, would create the desired unifying theme as well as provide physical protection from the elements. “The location of trees is crucial” (Pei & Partners 1977). Thus, the design placed them in the center, diagonally spaced, 32 feet apart so as not to block accessibility or visibility of the structures lining the mall and to maintain the visibility and unique visual qualities of the exiting street. The sidewalks were widened to 19 feet (from 15 feet) and were considered quasi-private spaces that were essentially adjuncts to the shops lining the street. The transit lanes were physically depressed from the sidewalks, but visually cohesive with the pavement pattern. The designers wanted to define the vehicular lanes for safety reasons, but also to make this definition in the least visually obtrusive way.

The design concept took into consideration the existing scale of the street with its variety of visual elements, buildings sizes and uses, and unique interest of the street. The challenge for the designers was to “create a unifying theme and common identity for the street, while protecting its distinctive personality” (Pei & Partners 1977). With its benches, fountains and other amenities, the design intentionally created a framework and a setting for both present planned uses and for the future. “Ample space is provided for sidewalk cafes, kiosks, vending carts, and displays which can evolve into permanent elements or change as different needs emerge” (Pei & Partners 1977).

Laurie Olin and Pei’s principal designer, Henry Cobb, discussed a design approach of Southwestern geometric patterns early in their separate processes, then during their collaborative program, discussed including Navajo Chief-style blankets with polychrome diamond motifs. While still discussing the final design, Olin visited a souvenir shop along 16th Street Mall and encountered trouser belts decorated with diamondback rattlesnake skins. From those inspirations, the architects and landscape architects crafted the mall’s overall design, precisely interwoven within three shades of granite pavers and unified by the tree plantings (see Section 21), and lighting standards. Signage, planters, street furniture (benches, shelters), fountains, banners and other moveable objects (mailboxes, phone boxes, trash receptacles) were part of the overall plan and were given a uniform design and placed along the street in a planned pattern to blend with the rest of the mall’s design features.
The tree selection process was extensive and began with the evaluation of 72 species, based on criteria created by the design team; among them, “height and diameter, trunk, branch, leaf and root form, shade characteristics, sun, water and maintenance needs, disease and insect susceptibility, wind and pollution tolerance, availability and cost” (Pei & Partners 1977). Based on their evaluation, the team selected the honey locust for the center blocks and red oak for the ends.

Following the mall’s completion in October 1982, the project won the University of Colorado’s 1983 “Honor Award for Excellence in Urban Design,” the Associated Landscape Contractors of America’s 1984 “Environmental Improvement Award of Distinction” (Historic Denver, Inc. 2012a), and the American Society of Landscape Architects’ 1985 “Professional Award, Design Category” (CLF 2009). The Urban Land Institute (ULI) named the mall in 2008 “public art of the highest international quality” (ULI 2008). Henry Cobb is now a Fellow of the American Institute of Architects; Laurie Olin is a Fellow of the American Society of Landscape Architects, and recognized as a “Pioneer” by CLF (2009); the 16th Street Transitway and Mall is designated by that organization as a signature “Landslide” and “At-Risk Landscape.”

36. Sources of information:

Aspen Historical Society

Cultural Landscape Foundation (CLF)

Denver Downtown Partnership, Inc., et al.

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1982 Downtown Denver’s 16th Street Mall: A National Example Of A Successful Transit/pedestrian System. On-file with RTD.

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1977 The Transitway/Mall: A Transportation Project in the Central Business District of Metropolitan Denver. Available at Denver Public Library, Western History Collection.


Pei Cobb Freed & Partners

Regional Transportation District (RTD)


Sixteenth Street Mall Corporation

Urban Land Institute (ULI)

Wiseman, Carter
VI. SIGNIFICANCE

37. Local landmark designation: Yes ___ No X ___ Date of designation: _____
   Designating authority:

38. Applicable National Register [of Historic Places, NRHP] Criteria:
   X A. Associated with events that have made a significant contribution to the broad pattern of our
       history;
   ___ B. Associated with the lives of persons significant in our past;
   X C. Embodies the distinctive characteristics of a type, period, or method of construction, or
       represents the work of a master, or that possess high artistic values, or represents a
       significant and distinguishable entity whose components may lack individual distinction; or
   ___ D. Has yielded, or may be likely to yield, information important in history or prehistory.
   X G. Qualifies under Criteria Considerations A through G (see Manual)
   ___ Does not meet any of the above National Register criteria

39. Area(s) of significance: Criterion A: Transportation, Community Planning and Development; Road-
   Related (vehicular); Criterion C: Engineering; Landscape Architecture; Criteria Consideration G:
   Properties That Have Achieved Significance Within the Last Fifty Years.


41. Level of significance: National ___ State X ___ Local X ___

42. Statement of significance: This analysis concludes the 16th Street Mall meets Criterion Consideration G,
   as a property that is identifiable as historically significant at less than 50 years old. The property is eligible
   for listing in the NRHP under Criterion A at a local level and Criterion C at the state and local level of
   significance. Its period of significance is 1980 through 1982, the period of its final design and construction.
   In meeting the Criterion Consideration G, the original design and construction elements from 1982
   transformed Denver’s downtown streetscape, when the transitway and mall opened, and best represent
   the exceptional conceptualization of its architects. The following provides additional information
   regarding this evaluation.

Criterion A: The 16th Street Mall is eligible for listing in the NRHP under Criterion A at a local level in the
areas of Transportation and Community Planning and Development. The 16th Street Mall is significant for
transforming Denver’s downtown and revitalizing a fledging commercial district affected by post-World
War II development outside of the city. As Denver-area residents relied more on the automobile, City
streets became more congested and polluted, deterring downtown business growth and pedestrian use
(Denver Partnership, Inc., et al. 1982). The 16th Street commercial area was in decline by the 1960s and
1970s, caused by population shifts to suburban settings, new trends in retail, and the preeminence of the
automobile. Developers started to create large-scale shopping plazas on readily available land near new
suburban tracts, reducing the importance and draw of a downtown commercial corridor. By the 1970s, at
least 15 different shopping centers existed in the Denver area outside of the downtown. The Public Mall Act was signed into Colorado law in 1970, “allowing municipalities to close off downtown streets” and “in reaction to businesses moving out of downtown areas to suburban indoor malls” (Aspen Historical Society 2015).

Proceeding into the 1970s, Denver leaders, through federal financial assistance from the Urban Mass Transportation Administration, sought to disrupt this trend and revitalize the 16th Street corridor through addressing three major concerns: downtown blight, transportation, and noise/air pollution (Denver Partnership, Inc., et al. 1982). The 16th Street Mall’s distinctive design and unified concept, pedestrian and transit uses, and electric and diesel-powered bus-fleet addressed these issues, providing a resurgence in the area that was celebrated as a success almost immediately following its opening (Denver Partnership, Inc., et al. 1982). On its emergence in 1982, the 16th Street Mall sparked not only a noticeable economic boom in the area, the transformed corridor fostered a civic spirit diminished by post-World War II transportation and development trends (Denver Partnership, Inc., et al. 1982). Therefore, the 16th Street Mall has made a significant contribution to Denver and Colorado’s recent past and is significant under Criterion A at the local level.

The 16th Street Mall solidly fits within the context of cities across the United States that had initiated similar urban renewal projects in the early 1970s, renovating under-utilized and decayed urban spaces with new commercial, pedestrian, civic, and transit purposes (McKnight, et al. 2010). Decorative landscaping, hardscape features, and restricted automobile use were often cornerstones of these projects, typically completed in a Modern style aesthetic (McKnight, et al. 2010). The Fulton Mall in Fresno, California (completed in 1964) is one of the earliest examples, in addition to the Portland (Oregon) Transit Mall, Nicollet Mall (Minneapolis, completed 1968) and Chestnut Street Transitway (Philadelphia, completed in 1976) (Judge 2013). These projects also received federal assistance through agencies like the U.S. Department of Housing and Urban Development and the Urban Mass Transportation Administration (McKnight, et al. 2010; Judge 2013). During the planning of the 16th Street Mall project, the project team was admittedly influenced by Minneapolis’s eight-block Nicollet Mall (by Lawrence Halprin & Associates who also had designed Denver’s Skyline Park as a gateway to lower downtown in 1972-1975 [CLF 2016]). These projects tended to have a Modern-inspired design, a public bus component, and sought to improve a fledging business district (Denver Partnership, Inc., et al. 1982). To guide the 16th Street Mall project, designers traveled to cities with similar projects, like Minneapolis, to meet with business leaders, transportation experts, and elected officials (Denver Partnership, Inc., et al. 1982).

When considering the above historic context, the 16th Street Mall has not definitively achieved significance at a national or state level under Criterion A at this point in time. While its clear the significance and contributions made at the local level by the 16th Street Mall, more historical perspective and time is needed to fully understand if it has state or national significance for a resource using Criteria Consideration G. Per NPS guidance, additional scholarly evaluation and historical perspective over time will help the public
understand the role properties from the recent past have played at a national level (NPS 2002; NPS 1998). Compared to other properties that were determined significant under Criterion A at the national level less than 50 years after they were constructed, these properties tend to have broader implications on the history of the United States, associated with major national themes like the United Farm Workers’ movements and Apollo 11 launch. Few pedestrian and/or transit malls developed within the post-World War II context that generated the 16th Street Mall construction are listed on the National Register. The only notable example is the Lincoln Road Mall, a pedestrian mall constructed in Miami, Florida, ca. 1950 and itself needing revitalization by the late 1960s/early 1970s (Harden 2013), was listed on the NRHP in 2011 (NPS 2011). The Fulton Mall, named above, is eligible but not listed on the NRHP. The Nicollet Mall was redeveloped 2015 to 2017. Although pedestrian and transit malls of this sort continue to be developed as well as redeveloped across the nation, few from that initial era of post-World War II downtown redevelopment remain. A national study found that, by the mid-1980s, “85% of the original 200 U.S. pedestrian malls had been reopened to traffic” (Judge 2013:3; Harden 2013). South Burdick Street in Kalamazoo, Michigan—credited as being the first pedestrian mall established for downtown redevelopment, in 1959—reopened for vehicle traffic in 1998 (Harden 2013). Comparatively, the Denver Business Journal notes that, for Denver, “closing more than a mile of a downtown street to cars has been an unusual—and much-studied—success” (Harden 2013). As presented by the Denver Business Journal, many of the less enduring pedestrian malls were not as well planned and designed that of 16th Street.

**Criterion C:** As a historic property Denver’s 16th Street Mall is also significant at the local and state level under Criterion C in the area of Landscape Architecture, as an award-winning design by master designers, built with granite units in a unique, enduring, western-style pattern consistent along 12 blocks. It is also significant under Criterion C in the area of Engineering for its largely hidden but sophisticated matrix of drainage, irrigation, wiring, and “suspended pavement system” that accommodates large and deep root chambers for its 220 shade trees. (See Section 43 for the correlated review of historic integrity.) As noted by Pei’s team in their approach for the project, the designers successfully complemented the existing diversity of buildings and uses along the corridor (Pei, 1977; Pei, 1980). They developed a unifying theme and path of travel for pedestrians and buses that created a defined, new experience in the downtown (Pei, 1977). The scope and design of the project was unique at the time in Denver and Colorado, and its master designers received awards almost immediately following its completion (Historic Denver, Inc., 2012a; Denver Partnership, Inc., et al, 1982). Though constructed less than 50 years ago, it is a unique design and surviving example of Denver’s late twentieth century Modern style-inspired urban renewal efforts. As a result, it is eligible for listing in the NRHP under Criterion C at the state and local level.

Though significant for its design and engineering at the state and local level of significance, the 16th Street Mall has not yet achieved significance at the national level under Criterion C. As a less than 50-year old property, the 16th Street Mall represents is one of the exceptional works composed by the design team (NPS, 2002; NPS, 1998). NPS guidance advises that time and perspective are needed to understand how
properties fit within with the life work and contributions of masters to their field (NPS, 2002; NPS, 1998).

Although each of the principal designers is still living, Pei, Cobb, and Olin have all had full careers within which to understand the importance of their projects, including the 16th Street Mall. Pei is about 101, Cobb 92, and Olin 80 years old (as of 2018), and Pei and Cobb have important projects that are now over 50 years old and considered historic on that basis. Denver’s 16th Street Mall remains essential in representing their full body of work and is directly recognized as being among the noteworthy projects of these renowned designers (cf. CLF: https://tclf.org). The 16th Street Mall is historically important and exceptional within the history of Colorado at the state level for retaining examples of important works by these recognized masters, even though completed less than 50 years ago.

Colorado was where I. M. Pei and his associates, including Henry Cobb, first conducted completed a project as a fully independent design firm, after splitting fully from the firm of Webb and Knapp in 1960—where they had begun their careers (Wiseman 2007). They garnered further national recognition with development of the National Center for Atmospheric Research (NCAR) building in Boulder 1961 and 1967. In that Colorado design, Pei incorporated Southwestern elements reflective of Mesa Verde cliff dwellings and natural elements intended to incorporate and display aspects of nature while remaining monumental in a Modern style (Wiseman 2007). Distinctive influences from nature and Native Americans of Colorado and the Southwest would again be reflected in the design of the 16th Street Mall. The natural and cultural accents employed by the Pei team’s architects and landscape architects were in contrast to the starker concrete construction of most Modern design at the time, which has led this unadorned, function-driven construction style to sometimes be called “brutalism.”

While the 16th Street Mall further demonstrates Post-Modern influences, it’s design and concept reflect the earlier Modern examples completed in Philadelphia, Minnesota, and Fresno through federal and local agency involvement. As a Post-Modern structure, the 16th Street Mall incorporates elements of Denver’s Old West past in a contemporary interpretation; however, while advancing beyond earlier Modern examples, it has not led to a transformation of the property type throughout the country (ULI, 2008). The 16th Street Mall has not achieved significance at a national level under Criterion C at this point in time, however—to reiterate—is significant under Criterion C at the state and local level.

Criteria Consideration G: Although the 16th Street Mall is not yet 50 years old, it meets NRHP Criteria Consideration G as exceptionally important for its enduring design and for its celebrated role in helping to revitalize downtown Denver at a critical time for the city as it struggled with urban flight, insensitive urban renewal, and the decline of its mining and petroleum image and economy. Based on the supporting analysis above, the property is exceptionally significant at the state and local level due to the project’s role in shaping downtown Denver, and embodying a distinctive design by a team of master designers that is unique in the state.
**Character-Defining Features** (Pei & Partners, 1980):

- Paving pattern design consistent throughout the Transitway and Mall, between major cross streets, from Broadway northwest 12 blocks to Market Street.
- Granite paver units/modules, 1-foot 5-inch by 1-foot 5-inch, in three shades: charcoal gray, light gray, and “Colorado red” (specified as White, Black, and Red on the 1980 plans).
- Granite special units of charcoal and light gray for curbs, cuts, drains, and other applications.
- Original oak and honey locust trees planted in special under-pavement concrete root boxes and ringed at the surface with custom-designed and -cast iron trunk grates.
- Custom-designed and -built light standards.
- Street furniture of custom-designed and -built fiberglass trash and flower-planter receptacles, metal utility covers.
- Custom metal street signs on traffic signals and overhead lights.

43. Assessment of historic physical integrity related to significance: Portions of the design have been interrupted with subsequent repaving of cross-street intersections through the omission of scoring—called “sawcut joints”—the concrete pavement to match the granite pavers and general diagonal hash-pattern. Some integrity of materials has been lost with ad hoc replacement of granite pavers as they are damaged by vehicular wear or harsh weather (see Harvey 2015). Some integrity of materials and feeling has been lost through subsequent removal of most of the custom-designed telephone stands and the inactivity of below-pavement fountains. Some trees have been lost to disease or age, but this has had little overall impact to the setting, feeling and association of the 16th Street Mall. The original turn-around at Civic Center has been removed, but the mall retains integrity of design and workmanship on the remaining 12 blocks, even with the loss of that portion of the original design.

The 16th Street Transitway and Mall retains strong integrity of location, design, materials, workmanship, setting, feeling, and association and continues to convey its significance under NRHP Criteria A and C, and Criteria Consideration G.

VII. NATIONAL REGISTER ELIGIBILITY ASSESSMENT (See also 42)

44. National Register eligibility field assessment: Eligible X Not Eligible ____ Need Data ____

45. Is there National Register district potential? Yes ___ No X

Discuss: For the evaluated property: Although the transitway and mall comprise a linear resource, which would typically be classified as a site or district, this property is a consistently designed, constructed, and continuous structure, not a district or site. For the encompassing host of downtown Denver a number of commercial districts have been considered for NRHP registration, but never designated in areas that would include the 16th Street Mall between Broadway and Market Street as a contributing resource.

If there is National Register district potential, is this building: Contributing ____ Noncontributing ____

46. If the building is in existing National Register district, is it: Contributing ____ Noncontributing ____
VIII. RECORDING INFORMATION

47. Photograph numbers: N/A
   Negatives filed at: SWCA Environmental Consultants (digital files)


49. Date(s): June 2016; December 2017

50. Recorder(s): James Steely, Jennifer Moon, and Scott Phillips; Sara Orton and Jeremy Hollins

51. Organization: SWCA Environmental Consultants; CH2M (now Jacobs Engineering)

52. Address: SWCA: 295 Interlocken Boulevard, Suite 300, Broomfield, Colorado 80021
            CH2M: 3330 W. Esplanade Avenue, Suite 612, Metairie, LA 70002

53. Phone number(s): SWCA: 303-487-1183; CH2M: 504-810-0017

NOTE: Please include a sketch map, a photocopy of the USGS quad map indicating resource location, and photographs.
Figure 1. Location map.
Figure 2. Sketch map, showing resource boundary of 1982–1992 16th Street Transitway | Mall.
Figure 3. Original I.M. Pei / Hanna/Olin Block Plan as presented in 1980 drawings.
Figure 4. Original I.M. Pei / Hannan/Olin design for Planters and Trash Receptacles in 1980 drawings.

Figure 5. Original I.M. Pei / Hanna/Olin design for Post Lanterns in 1980 drawings.
- Overview of 16th Street Mall from Civic Center Station at Broadway.
- Facing northwest.
- Photographed by James Steely.
- Photo taken 06-06-2016.
- Image has not been altered.

- Overview of 16th Street Mall from Larimer Street.
- Facing southeast.
- Photograph courtesy of the Denver Post (2012).
- Photo taken in 1987.
- Image has not been altered.
• Overview of 16th Street Mall from Market Street.
• Facing southeast.
• Photographed by James Steely.
• Photo taken 06-06-2016.
• Image has not been altered.

• Close up of the original street sign at 16th Street Mall and Market Street.
• Facing west.
• Photographed by James Steely.
• Photo taken 06-06-2016.
• Image has not been altered.
- Overview of block design used on 16th Street Mall flanked by two original colored planters.
- Facing northeast.
- Photographed by James Steely.
- Photo taken 06-06-2016.
- Image has not been altered.

- Overview of block design used on 16th Street Mall.
- Facing unknown direction.
- Photograph courtesy of the Denver Post (2012).
- Photo taken in 1981.
- Image has not been altered.
• Overview of 16th Street Mall, including original colored planters, post lanterns, tree configuration, and the last remaining telephone booth in the project area (center background).
• Facing northwest.
• Photographed by James Steely.
• Photo taken 06-06-2016.
• Image has not been altered.

• Overview of a typical 16th Street Mall original post lantern.
• Close up.
• Photographed by James Steely.
• Photo taken 06-06-2016.
• Image has not been altered.
- Example of a Navajo diamond weaving pattern on a Phase III chief blanket from the 1930s.
- Photograph courtesy of the University of Colorado Museum of Natural History.
- Image has been cropped.

- Eastern diamondback rattlesnake.
- Photograph courtesy of Google Images (http://1.bp.blogspot.com/-bDG6zjposXc/UFGGBKhe5wl/AAAAAAAAMEc/8ra53cOJgxM/s1600/Eastern+Diamondback+Rattlesnake+Crotalus+adamanteus+September+2011+Phillip+s+Natural+World+ready+to+strike.jpg).
- Image has not been altered.
Attachment 3
Section 106 Consultation Record Summary
### Section 106 Communications Log

<table>
<thead>
<tr>
<th>Date</th>
<th>From</th>
<th>To</th>
<th>Subject</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/2/2015</td>
<td>FTA</td>
<td>SHPO</td>
<td>Initiation of Section 106 Consultation; RTD 16th Street Mall Transit-way Rehabilitation Project</td>
<td>Initiation of Section 106 consultation process and invitation of consultation under 36 CFR 800.3 for the proposed 16th Street Mall transit-way rehabilitation project.</td>
</tr>
<tr>
<td>6/2/2015</td>
<td>FTA</td>
<td>Kiowa Tribe</td>
<td>Invitation to Consult: FTD 16th Street Mall Transit-way Rehabilitation Project</td>
<td>FTA with RTD invites Kiowa Tribe of Oklahoma to serve as a historic consulting party under Section 106 of the National Historic Preservation Act for the RTD 16th Street Mall Transit-way Rehabilitation Project.</td>
</tr>
<tr>
<td>6/19/2015</td>
<td>SHPO</td>
<td>FTA</td>
<td>RE: Initiation of Section 106 Consultation; RTD 16th Street Mall Transit-way Rehabilitation Project</td>
<td>SHPO received initiation letter and looks forward to working together going forward.</td>
</tr>
<tr>
<td>6/22/2017</td>
<td>RTD-FTA</td>
<td>CPs</td>
<td>16th Street Mall Alternatives Analysis and Environmental Clearance - Workshop No. 1</td>
<td>Provides agenda for Workshop No. 1 (6/28-6/30/2017). The 3 planned workshops will be equivalent to 1 year of monthly meetings and allow, if a preferred alternative is selected, for design and construction to proceed and be completed within the next 5 years.</td>
</tr>
<tr>
<td>6/23/2017</td>
<td>FTA</td>
<td>SHPO</td>
<td>Re-Initiation of Consultation (HC No. 68388) The Future of Denver’s 16th Street Mall: Alternatives Analysis and Environmental Clearance Project</td>
<td>RTD with FTA is preparing an EA for the 16th Street Mall. Provides a description of undertaking. Improvement project has been expanded from 3.5 blocks to a proposed 12 block area. Project area now includes transitway, sidewalks, and pedestrian areas. Area of potential effects (APE) is being reconsidered. Once the APE has been defined, Section 106 process will be updated. Extends an invitation to participate to the consulting parties involved with the previous project.</td>
</tr>
<tr>
<td>8/11/2017</td>
<td>RTD-FTA</td>
<td>Consulting Parties</td>
<td>16th Street Mall Section 106 Consulting Parties Meetings</td>
<td>Invitation for two 16th Street Mall Section 106 consulting parties meetings (9/6/17 and 9/27/17). Provides most current purpose and need. Notification of upcoming send out of agenda and materials.</td>
</tr>
<tr>
<td>8/23/2017</td>
<td>RTD-FTA</td>
<td>Consulting Parties</td>
<td>16th Street Mall Consulting Party Meeting, 09/06/17</td>
<td>Provides materials for the 9/6/2017 meeting. Provides 2 project examples where a project is contained entirely within a historic property.</td>
</tr>
<tr>
<td>9/5/2017</td>
<td>HistDen</td>
<td>Consulting Parties</td>
<td>RE: 16th Street Mall, Consulting Party Meeting, 09/06/17 [EXTERNAL]</td>
<td>Request for additional updates/materials prior to meeting.</td>
</tr>
<tr>
<td>9/15/2017</td>
<td>RTD-FTA</td>
<td>Consulting Parties</td>
<td>16th Street Mall Section 106 Consulting Parties Meeting No. 3</td>
<td>Provides a reminder for the Consulting Parties Meeting No. 3 (9/27/2017) and informs that the agenda and materials will be sent the following week.</td>
</tr>
<tr>
<td>9/18/2017</td>
<td>RTD-FTA</td>
<td>Consulting Parties</td>
<td>16th Street Mall Section 106 Consulting Parties documents</td>
<td>Provides meeting notes from the 9/06/2017 meeting and agenda for 9/27/2017 meeting.</td>
</tr>
<tr>
<td>9/21/2017</td>
<td>RTD-FTA</td>
<td>Consulting Parties</td>
<td>16th Street Mall Workshop No. 2</td>
<td>Invitation to the workshop on 10/2/2017. Provides drawings, comments, and a draft future statement.</td>
</tr>
<tr>
<td>9/22/2017</td>
<td>RTD-FTA</td>
<td>Consulting Parties</td>
<td>RE: 16th Street Mall Section 106 Consulting Parties documents</td>
<td>Provides presentation for meeting (9/27/2017) and Level 1 Alternatives Analysis for Alignment Alternatives.</td>
</tr>
<tr>
<td>9/25/2017</td>
<td>RTD-FTA</td>
<td>Consulting Parties</td>
<td>RE: 16th Street Mall Section 106 Consulting Parties follow up</td>
<td>Provides the 2014 16th Street Pilot Repair final report and informs that a comparative cost analysis for various pavement materials has yet to be completed but is scheduled for November.</td>
</tr>
<tr>
<td>10/12/2017</td>
<td>HistDen</td>
<td>RTD-FTA</td>
<td>RE: 16th Street Mall Section 106 Consulting Parties Meeting No. 3 Notes [EXTERNAL]</td>
<td>Request for graphics for various paver pattern studies.</td>
</tr>
<tr>
<td>10/12/2017</td>
<td>RTD-FTA</td>
<td>Consulting Parties</td>
<td>RE: 16th Street Mall Section 106 Consulting Parties Meeting No. 3</td>
<td>Provides link to the Drop Box containing 5 requested items. Informs that RTD is working on the claims data on pedestrian and transit incidents.</td>
</tr>
<tr>
<td>Date</td>
<td>From</td>
<td>To</td>
<td>Subject</td>
<td>Summary</td>
</tr>
<tr>
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<td>-------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>10/12/2017</td>
<td>RTD-FTA</td>
<td>Consulting Parties</td>
<td>16th Street Mall Section 106 Consulting Parties Meeting No. 3 Notes</td>
<td>Provides meeting notes from the 9/27/2017 consulting party meeting. Attachment includes agenda and sign-in sheet but not final presentation since it was delivered directly after the meeting. Informs parties about a new Drop Box for delivery of materials.</td>
</tr>
<tr>
<td>10/18/2017</td>
<td>FTA</td>
<td>HistDen</td>
<td>RE: Comments on Form 1403 [EXTERNAL]</td>
<td>Confirms receipt of comments from HistDen.</td>
</tr>
<tr>
<td>10/18/2017</td>
<td>HistDen</td>
<td>RTD-FTA</td>
<td>Comments on Form 1403 [EXTERNAL]</td>
<td>Provides 7 comments on the 1403 form.</td>
</tr>
<tr>
<td>10/25/2017</td>
<td>RTD-FTA</td>
<td>Consulting Parties</td>
<td>FW: Comments on Form 1403 [EXTERNAL]</td>
<td>Provides 7 comments on the 1403 form to the Consulting Parties.</td>
</tr>
<tr>
<td>10/25/2017</td>
<td>RTD</td>
<td>RTD-FTA</td>
<td>RE: Comments on Form 1403 [EXTERNAL]</td>
<td>Allows delivery of comments to the consulting parties group.</td>
</tr>
<tr>
<td>11/7/2017</td>
<td>HistDen</td>
<td>RTD &amp; FTA</td>
<td>16th Street Mall Letter</td>
<td>Informs the management team that the attached letter was sent to RTD.</td>
</tr>
<tr>
<td>11/30/2017</td>
<td>RTD-FTA</td>
<td>Consulting Parties</td>
<td>16th Street Mall Consulting Parties Meeting No. 4</td>
<td>Provides the meeting notes and materials from the 11/14/2017 meeting. Informs that a separate email will be sent with the agenda, materials, and presentation for the 12/14/2017 meeting.</td>
</tr>
<tr>
<td>12/15/2017</td>
<td>RTD</td>
<td>HistDen</td>
<td>RE: 16th Street Mall Project; November 7, 2017 Historic Denver Letter</td>
<td>Confirms receipt of 11/7/2017 letter regarding the 16th Street Mall project. Invitation to join the next consulting parties meeting (01/11/18).</td>
</tr>
<tr>
<td>1/22/2018</td>
<td>RTD</td>
<td>NTHP</td>
<td>RE: 16th Street Mall Purpose and Need [EXTERNAL]</td>
<td>Provides purpose and need statement for the project to NTHP and provides contact information.</td>
</tr>
<tr>
<td>1/26/2018</td>
<td>HistDen</td>
<td>RTD &amp; FTA</td>
<td>Additional Comments on 1403 [EXTERNAL]</td>
<td>Provides additional comments and explanations on the Form 1403.</td>
</tr>
<tr>
<td>1/31/2018</td>
<td>RTD</td>
<td>HistDen</td>
<td>RE: Additional Comments on 1403 [EXTERNAL]</td>
<td>Confirms receipt of comments.</td>
</tr>
<tr>
<td>2/8/2018</td>
<td>RTD</td>
<td>FTA</td>
<td>RE: Comments on Form 1403 [EXTERNAL]</td>
<td>RTD has not received any comments (beyond HistDen) on the Form 1403.</td>
</tr>
<tr>
<td>2/9/2018</td>
<td>NTTHP</td>
<td>RTD-FTA</td>
<td>RE: 16th Street Mall Purpose and Need [EXTERNAL]</td>
<td>Requests details and materials for the 2/27/2018 meeting. Informs Betsy will be replacing Jenny as point of contact for the NTHP.</td>
</tr>
<tr>
<td>2/12/2018</td>
<td>RTD</td>
<td>FTA</td>
<td>RE: Comments on Form 1403 [EXTERNAL]</td>
<td>Informs RTD did not directly receive any comments on the Form 1403.</td>
</tr>
<tr>
<td>2/22/2018</td>
<td>Postmaster</td>
<td>C-A Tribes</td>
<td>Undeliverable: 2/27/18 Consulting Party Meeting</td>
<td>Undeliverable email notification.</td>
</tr>
</tbody>
</table>

Section 106 Consultation Record through 3/8/2014
Attachment 4
Historic Properties Map Book
Map Book 2
Identified Historic Properties
16th Street Mall
March 2019

DEN I:\CCD\16thStreetMall\Maps\Report\Cultural\Cultural_Historic_Properties_b_v9.mxd  3/29/2019

Legend:
- Area of Potential Effects
- Parcel Boundary
- Historic Properties
  - Listed on NRHP
  - Eligible for NRHP
- Historic Districts
  - Eligible for NRHP
  - Contributes to Historic District

Map of identified historic properties on 16th Street Mall.
Attachment 5
Table of Historic Properties within the APE
<table>
<thead>
<tr>
<th>Site ID</th>
<th>Site Name</th>
<th>Site Address</th>
<th>Construction Date</th>
<th>NRHP Eligibility</th>
<th>Site Photo</th>
</tr>
</thead>
<tbody>
<tr>
<td>5DV.118</td>
<td>Daniels &amp; Fisher Tower ~ Daniels, Fisher &amp; Company (Dry Goods) ~ May D&amp;F Tower</td>
<td>1101 16th Street 1601 Arapahoe Street</td>
<td>1911-1911</td>
<td>Listed on NRHP</td>
<td><img src="image1.jpg" alt="Site Photo" /></td>
</tr>
<tr>
<td>5DV.135</td>
<td>Denver Dry Goods Company Building ~ The Denver Dry Goods Building</td>
<td>702 16th Street California Street and 16th Street</td>
<td>1888-1889</td>
<td>Listed on NRHP</td>
<td><img src="image2.jpg" alt="Site Photo" /></td>
</tr>
<tr>
<td>5DV.136</td>
<td>Masonic Temple Building</td>
<td>1614 Welton Street 535 16th Street</td>
<td>1889-1890</td>
<td>Listed on NRHP</td>
<td><img src="image3.jpg" alt="Site Photo" /></td>
</tr>
<tr>
<td>Site ID</td>
<td>Site Name</td>
<td>Site Address</td>
<td>Construction Date</td>
<td>NRHP Eligibility</td>
<td>Site Photo</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------</td>
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<td>-------------------</td>
<td>------------------</td>
<td>------------</td>
</tr>
<tr>
<td>5DV.139</td>
<td>Kittredge Building</td>
<td>511 16th Street</td>
<td>1889-1891</td>
<td>Listed on NRHP</td>
<td></td>
</tr>
<tr>
<td>5DV.142</td>
<td>A.C. Foster Building ~</td>
<td>910-918 16th Street</td>
<td>1911-1911</td>
<td>Listed on NRHP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University Building ~</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5DV.1725</td>
<td>Independence Plaza</td>
<td>1001 16th Street</td>
<td>1971</td>
<td>NRHP-eligible</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prudential Plaza</td>
<td>1050 17th Street</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site ID</td>
<td>Site Name</td>
<td>Site Address</td>
<td>Construction Date</td>
<td>NRHP Eligibility</td>
<td>Site Photo</td>
</tr>
<tr>
<td>--------</td>
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<td>------------</td>
</tr>
<tr>
<td>5DV.1760</td>
<td>Bridgepoint Plaza Park Central</td>
<td>1110 16th Street 1515 Arapahoe Street 1111 15th Street</td>
<td>1973</td>
<td>NRHP-eligible</td>
<td><img src="image1.jpg" alt="Site Photo" /></td>
</tr>
<tr>
<td>5DV.1832</td>
<td>Security Life Building ~ 1600 Glenarm Place</td>
<td>1600-16 Glenarm Place</td>
<td>1965-1965</td>
<td>NRHP-eligible</td>
<td><img src="image2.jpg" alt="Site Photo" /></td>
</tr>
<tr>
<td>5DV.1854</td>
<td>Hilton Hotel; Radisson Hotel; Adams Mark Hotel</td>
<td>1550 Court Place</td>
<td>1958-1960</td>
<td>NRHP-eligible</td>
<td><img src="image3.jpg" alt="Site Photo" /></td>
</tr>
<tr>
<td>Site ID</td>
<td>Site Name</td>
<td>Site Address</td>
<td>Construction Date</td>
<td>NRHP Eligibility</td>
<td>Site Photo</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------------------------------------------------------------</td>
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<td>------------</td>
</tr>
<tr>
<td>5DV.1856</td>
<td>Dome Tower ~ Great West Plaza ~ World Trade Center</td>
<td>1625 Broadway</td>
<td>1980-&gt;1980</td>
<td>NRHP-eligible</td>
<td><img src="image1.png" alt="Site Photo" /></td>
</tr>
<tr>
<td>5DV.1877</td>
<td>Zeckendorf Plaza; May D &amp; F Plaza; Hyperbolic Paraboloid; Adams Mark Hotel; Sheraton Hotel</td>
<td>350 16th Street 1550 Court Place</td>
<td>1960-1960&gt;1960</td>
<td>NRHP-eligible</td>
<td><img src="image2.png" alt="Site Photo" /></td>
</tr>
<tr>
<td>5DV.1878</td>
<td>Colorado Federal Savings, McDonald’s</td>
<td>200 16th Street</td>
<td>1957-1958</td>
<td>NRHP-eligible</td>
<td><img src="image3.png" alt="Site Photo" /></td>
</tr>
<tr>
<td>Site ID</td>
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<td>Site Address</td>
<td>Construction Date</td>
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</tr>
<tr>
<td>5DV.1880</td>
<td>Petroleum Club Building ~ Petroleum Building ~ 110 Building</td>
<td>110 16th Street</td>
<td>1954-1957</td>
<td>NRHP-eligible</td>
<td><img src="image" alt="Site Photo" /></td>
</tr>
<tr>
<td>5DV.1913</td>
<td>Joslin Dry Goods Company Building ~ Tritch Building ~ Savoy Grille ~ Joslin Building ~ Marriott Courtyard Hotel</td>
<td>934-938 16th Street</td>
<td>1887-1887</td>
<td>Listed on NRHP</td>
<td><img src="image" alt="Site Photo" /></td>
</tr>
<tr>
<td>5DV.1914</td>
<td>Federal Reserve</td>
<td>1020 16th Street</td>
<td>1968-</td>
<td>NRHP-eligible</td>
<td><img src="image" alt="Site Photo" /></td>
</tr>
<tr>
<td>Site ID</td>
<td>Site Name</td>
<td>Site Address</td>
<td>Construction Date</td>
<td>NRHP Eligibility</td>
<td>Site Photo</td>
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</tr>
<tr>
<td>5DV.47</td>
<td>Lower Downtown Denver Historic District</td>
<td>Multiple</td>
<td></td>
<td>NRHP-eligible</td>
<td></td>
</tr>
<tr>
<td>5DV.47.15</td>
<td>Waters Building ~ Market Center</td>
<td>1642 - 1644 Market Street</td>
<td>1885-1885</td>
<td>Contributes to NPS Certified District &gt; Within official eligible district</td>
<td></td>
</tr>
<tr>
<td>Site ID</td>
<td>Site Name</td>
<td>Site Address</td>
<td>Construction Date</td>
<td>NRHP Eligibility</td>
<td>Site Photo</td>
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</tr>
<tr>
<td>5DV.47.37</td>
<td>Hitchings Block</td>
<td>1620 Market Street</td>
<td>1890-1899</td>
<td>Contributes to NPS Certified District &gt; Within official eligible district</td>
<td><img src="image1" alt="Site Photo" /></td>
</tr>
<tr>
<td>5DV.47.7</td>
<td>Liebhardt-Lindner Building ~ Market Center</td>
<td>1624 Market Street</td>
<td>1881-1881</td>
<td>Contributes to NPS Certified District &gt; Within official eligible district</td>
<td><img src="image2" alt="Site Photo" /></td>
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<tr>
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<td>Site Name</td>
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<td>Construction Date</td>
<td>NRHP Eligibility</td>
<td>Site Photo</td>
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</tr>
<tr>
<td>5DV.47.96</td>
<td>McCrary Block ~ Market Center</td>
<td>1626-32 Market Street</td>
<td>1884-1884</td>
<td>Contributes to NPS Certified District &gt; Within official eligible district</td>
<td><img src="image1.jpg" alt="Site Photo" /></td>
</tr>
<tr>
<td>5DV.493</td>
<td>Symes Building; F.W. Woolworth Company</td>
<td>820 16th Street</td>
<td>1905-1905</td>
<td>NRHP-eligible</td>
<td><img src="image2.jpg" alt="Site Photo" /></td>
</tr>
<tr>
<td>Site ID</td>
<td>Site Name</td>
<td>Site Address</td>
<td>Construction Date</td>
<td>NRHP Eligibility</td>
<td>Site Photo</td>
</tr>
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<td>------------</td>
</tr>
<tr>
<td>5DV.494</td>
<td>A.T. Lewis And Son Department Store “Holtzman And Appel Block”</td>
<td>800-816 16th Street</td>
<td>1891-1891</td>
<td>Listed on NRHP</td>
<td><img src="image1.png" alt="Site Photo" /></td>
</tr>
<tr>
<td>5DV.496</td>
<td>Neusteter Building “Neusteter's”</td>
<td>720-726 16th Street</td>
<td>1924-1924</td>
<td>Listed on NRHP</td>
<td><img src="image2.png" alt="Site Photo" /></td>
</tr>
<tr>
<td>5DV.497</td>
<td>Hayden, Dickinson &amp; Feldhauser Building “Colorado Building”</td>
<td>1609-1615 California Street</td>
<td>1891-1891</td>
<td>NRHP-eligible</td>
<td><img src="image3.png" alt="Site Photo" /></td>
</tr>
<tr>
<td>Site ID</td>
<td>Site Name</td>
<td>Site Address</td>
<td>Construction Date</td>
<td>NRHP Eligibility</td>
<td>Site Photo</td>
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</tr>
<tr>
<td>5DV.499</td>
<td>McClintock Building</td>
<td>1554 California Street</td>
<td>1911-1911</td>
<td>Listed on NRHP</td>
<td><img src="image1.png" alt="Site Photo" /></td>
</tr>
<tr>
<td>5DV.500</td>
<td>Steel's Department Store; Steel's Corner; Steel Building; Fontius Building; Sage Building</td>
<td>1555 Welton 600 16th Street</td>
<td>1922</td>
<td>Contributes to NPS Certified District &gt; Within official eligible district</td>
<td><img src="image2.png" alt="Site Photo" /></td>
</tr>
<tr>
<td>5DV.5297</td>
<td>Liebhardt Building; Cottrell Clothing Company</td>
<td>601 16th Street</td>
<td>1915-</td>
<td>Contributes to NPS Certified District &gt; Within official eligible district</td>
<td><img src="image3.png" alt="Site Photo" /></td>
</tr>
<tr>
<td>Site ID</td>
<td>Site Name</td>
<td>Site Address</td>
<td>Construction Date</td>
<td>NRHP Eligibility</td>
<td>Site Photo</td>
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</tr>
<tr>
<td>5DV.5298</td>
<td>Walgreens</td>
<td>801 16th Street</td>
<td>1955-</td>
<td>NRHP-eligible</td>
<td><img src="image1.jpg" alt="Site Photo" /></td>
</tr>
<tr>
<td>5DV.7044</td>
<td>16th Street Mall</td>
<td>1-1300 16th Street</td>
<td>1982-1982</td>
<td>NRHP-eligible</td>
<td><img src="image2.jpg" alt="Site Photo" /></td>
</tr>
<tr>
<td>5DV.8274</td>
<td>Skyline Park</td>
<td>1500-1800 Arapahoe Street</td>
<td>1973-1973</td>
<td>NRHP-eligible</td>
<td><img src="image3.jpg" alt="Site Photo" /></td>
</tr>
<tr>
<td>Site ID</td>
<td>Site Name</td>
<td>Site Address</td>
<td>Construction Date</td>
<td>NRHP Eligibility</td>
<td>Site Photo</td>
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</tr>
<tr>
<td>5DV. 842</td>
<td>16th Street Mall Historic District</td>
<td>Multiple</td>
<td>1982</td>
<td>NRHP-eligible</td>
<td></td>
</tr>
</tbody>
</table>
Attachment 6
Pattern and Geometry Studies
Pattern & Geometry Studies

Existing Configuration

Existing Median

Large diamonds and trees define pedestrian promenade
Medium diamonds define the transit way
2' wide bands visually define transit way
Pattern dissapates at edges

Existing Asymmetrical

Large diamonds and trees define pedestrian promenade
Medium diamonds define the transit way
2' wide bands visually define transit way
Pattern dissapates at edges

Revised Asymmetrical

Existing Asymmetrical

Large diamonds and trees define pedestrian promenade
Medium diamonds define the transit way
2' wide bands visually define transit way
Pattern dissapates at edges

New Asymmetrical A

Large diamonds and trees define pedestrian promenade
Medium diamonds define the transit way
2' wide bands visually define transit way
Pattern dissapates at edges

Trees aligned at 32' from building edge

Trees maintain existing alignment and spacing

Pedestrian lights moved from median

4' median removed and sidewalk area expanded

Trees spaced 4' from transit lane: does not meet requirements
Maintain Spatial Relationships

**Option 1: Prioritize Allee Alignment**

New Asymmetrical

- Large diamonds define the transit lane.
- Medium diamonds define the public realm/amenity area.
- Paving band defines transit lane.
- Pattern dissipates at edges.
- Elongated diamond in paving band moved to accommodate tree planting. 2x2 diamond added.

Center Running Transit

- Large diamonds define the transit lane.
- Medium diamonds define the public realm/amenity area.
- Paving band defines transit lane.
- Pattern dissipates at edges.

Pubic Use

- Pedestrian Zone splits around tree.
- Amenity zone at edge reduced.
- Proximity of tree to building edge will reduce potential canopy.

**Option 2: Prioritize Pattern Consistency**

New Asymmetrical

- Large diamonds define the transit lane.
- Medium diamonds define the public realm/amenity area.
- Paving band defines transit lane.
- Pattern dissipates at edges.

Center Running Transit

- Large diamonds define the transit lane.
- Medium diamonds define the public realm/amenity area.
- Paving band defines transit lane.
- Pattern dissipates at edges.
- Tree moved to elongated triangle in paving band. No other changes to pattern.

Pubic Use

- Pedestrian Zone splits around tree.
- Pedestrian Zone defined by trees.
- Amenity spaces under trees.
- Spacing provides potential for 40’ tree canopy, which could close above transit lanes.
Maintain Programmatic Relationships

Option 1: Prioritize Allee Alignment

- **New Asymmetrical**
  - Large diamonds define pedestrian promenade
  - Medium diamonds define transit lane
  - Paving band defines transit lane
  - Pattern does not dissipate at edge
  - 4x4 diamond at edge of transit lane removed, replaced by 2x2 diamond

Option 2: Prioritize Pattern Consistency

- **New Asymmetrical**
  - Large diamonds define pedestrian promenade
  - Medium diamonds define transit lane
  - Paving band defines transit lane
  - Pattern dissipates less at edges
  - 4x4 diamond at edge of transit lane removed, replaced by 2x2 diamond

**Center Running Transit**

- Large diamonds define pedestrian promenade
- Medium diamonds define transit lane
- Paving band defines transit lane
- Pattern does not dissipate at edge
- 4x4 diamond at edge of transit lane removed, replaced by 2x2 diamond

- Pedestrian Zone splits around tree
- Amenity zone at edge reduced
- Proximity of tree to building edge will reduce potential canopy
- Amenity zone at edge reduced
- Proximity of tree to building edge will reduce potential canopy

- 48' spacing across street will be difficult to close with tree canopy
- 48' spacing across street will be difficult to close with tree canopy

**Pubic Use**

- 20' Pedestrian Zone splits around tree
- Pedestrian Zone defined by trees
- 20' Pedestrian Zone splits around tree
- Pedestrian Zone defined by trees

- Amenity zone at edge reduced
- Proximity of tree to building edge will reduce potential canopy
- Amenity zone at edge reduced
- Proximity of tree to building edge will reduce potential canopy

- 48' spacing across street will be difficult to close with tree canopy
- 48' spacing across street will be difficult to close with tree canopy

- Spacing provides potential for 40' tree canopy, which could close above transit lanes.
Attachment 7
Tree Box Design
Attachment 8
Tree Candidates
**Tree Candidates**

**Honeylocust and Similar**

<table>
<thead>
<tr>
<th>ID</th>
<th>Family</th>
<th>Botanical Name</th>
<th>Acceptable Cultivar</th>
<th>Common Name</th>
<th>Hardiness Zone</th>
<th>Moisture Level</th>
<th>Soil Salt Tolerance</th>
<th>Aerocud Salt Tolerance</th>
<th>Water Quality Area</th>
<th>Height at Maturity</th>
<th>Canopy Spread at Maturity</th>
<th>Growth Form/Shape</th>
<th>Flowers</th>
<th>Leaf Color – Spring</th>
<th>Leaf Color – Fall</th>
<th>Subject to Change*</th>
<th>Additional Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
<td>Bignoniaceae</td>
<td>Catalpa speciosa – Western Catalpa</td>
<td>5 Xeric to Min</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>50</td>
<td>35</td>
<td>Irregular pyramidal to rounded</td>
<td>Large, white flowers in spring to summer; heart</td>
<td>Green</td>
<td>Yellow</td>
<td>No</td>
<td>Heat, drought, and alkaline soil tolerant. Decay when wounded or tree ages may be an issue.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>15</td>
<td>Fabaceae</td>
<td>Gleditsia triacanthos 'Inermis'</td>
<td>Harve</td>
<td>Northern Acacia Honeylocust</td>
<td>3b</td>
<td>Xeric</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Yes</td>
<td>40</td>
<td>30</td>
<td>Broad pyramidal</td>
<td>Insignificant</td>
<td>Green</td>
<td>Yellow</td>
<td>No</td>
<td>Thornless and thornless culture. Genus overplanted in Denver region.</td>
</tr>
<tr>
<td>7</td>
<td>Fabaceae</td>
<td>Gleditsia triacanthos 'Inermis'</td>
<td>Espresso</td>
<td>Kentucky Coffeetree</td>
<td>4</td>
<td>–</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Yes</td>
<td>–</td>
<td>–</td>
<td>Spreading vase</td>
<td>Growth-white clusters in late spring</td>
<td>Blue-green</td>
<td>Yellow</td>
<td>Yes</td>
<td>Male (fruitlets) culture: Tolerant of urban growing conditions. No known insect or disease issues. Leaves, seeds, and pulp reported to be poisonous if ingested.</td>
</tr>
<tr>
<td>16</td>
<td>Fabaceae</td>
<td>Gleditsia triacanthos 'Inermis'</td>
<td>Skademaker Honeylocust</td>
<td>4 Xeric</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Yes</td>
<td>40</td>
<td>30</td>
<td>Vase to rectangular</td>
<td>Insignificant</td>
<td>Green</td>
<td>Yellow</td>
<td>No</td>
<td>Thornless and thornless culture. Central leader less present than skademaker. Gene overplanted in Denver region.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>Platanaceae</td>
<td>Platanus occidentalis</td>
<td>Biemack</td>
<td>Northern American Sycamore</td>
<td>3 Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>75</td>
<td>60</td>
<td>Pyramidal to rounded</td>
<td>Insignificant</td>
<td>Green</td>
<td>Yellow</td>
<td>No</td>
<td>Cold hardy culture of parent species. Large root system requires large tree lawn. NGU introduced – availability may be limited.</td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>Platanus</td>
<td>Platanus ×acerifolia</td>
<td>Morton Circle</td>
<td>Europollard London Planetree</td>
<td>5 Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>50</td>
<td>30</td>
<td>Pyramidal</td>
<td>Insignificant</td>
<td>Green</td>
<td>Yellow</td>
<td>No</td>
<td>Upper branches display showy bark. Cultivar more resistant to disease than parent species. Large root system requires large tree lawn.</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Sapindaceae</td>
<td>Koelreuteria paniculata – Goldenrain</td>
<td>5 Xeric</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>30</td>
<td>30</td>
<td>Open, rounded</td>
<td>Yellow in summer, very showy</td>
<td>Green</td>
<td>Yellow</td>
<td>No</td>
<td>Volunteer seedlings could be an issue in mulched areas.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>24</td>
<td>Fabaceae</td>
<td>Sophora japonica</td>
<td>Halka</td>
<td>Millstone Japanese Pagoda tree</td>
<td>5 Min</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>40</td>
<td>30</td>
<td>Broad oval to rounded</td>
<td>Creamy white in summer, showy</td>
<td>Dark green</td>
<td>Yellow</td>
<td>Yes</td>
<td>Tolerant of urban conditions, including heat, drought, and compacted soils.</td>
<td></td>
</tr>
<tr>
<td>126</td>
<td>Rutaceae</td>
<td>Pteleospermum amurense</td>
<td>Macho</td>
<td>Macho Anoru Cortbine</td>
<td>4 Min to mod</td>
<td>Intermediate</td>
<td>No</td>
<td>40</td>
<td>40</td>
<td>Upright to rounded</td>
<td>Green-white in spring, insignificant</td>
<td>Green</td>
<td>Yellow</td>
<td>No</td>
<td>Male, seedless culture of parent species. Large, shallow root system requires large tree lawn.</td>
<td></td>
<td></td>
</tr>
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</table>

**Shade Trees**

<table>
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<tr>
<th>ID</th>
<th>Family</th>
<th>Botanical Name</th>
<th>Acceptable Cultivar</th>
<th>Common Name</th>
<th>Hardiness Zone</th>
<th>Moisture Level</th>
<th>Soil Salt Tolerance</th>
<th>Aerocud Salt Tolerance</th>
<th>Water Quality Area</th>
<th>Height at Maturity</th>
<th>Canopy Spread at Maturity</th>
<th>Growth Form/Shape</th>
<th>Flowers</th>
<th>Leaf Color – Spring</th>
<th>Leaf Color – Fall</th>
<th>Subject to Change*</th>
<th>Additional Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Fagaceae</td>
<td>Quercus macrocarpa</td>
<td>J5-KW14</td>
<td>Cobblestone Oak</td>
<td>3 Xeric</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>50</td>
<td>40</td>
<td>Broad oval</td>
<td>Insignificant</td>
<td>Dark green</td>
<td>Yellow</td>
<td>No</td>
<td>Bark displays more bark-like features than species parent.</td>
<td></td>
</tr>
<tr>
<td>130</td>
<td>Fagaceae</td>
<td>Quercus rubra</td>
<td>–</td>
<td>Chickasap Oak</td>
<td>3 Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>No</td>
<td>45</td>
<td>50</td>
<td>Upright oval to rounded</td>
<td>Insignificant</td>
<td>Yellow-green</td>
<td>Yellow</td>
<td>Yes</td>
<td>Tolerant of alkaline soils. Transplant in spring for best survival. Prune to develop central leader.</td>
<td></td>
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<tr>
<td>31</td>
<td>Ulmaceae</td>
<td>Celtis laevigata</td>
<td>All Seasons, Magnifica</td>
<td>Sugar Hackberry</td>
<td>5 Xeric to Min</td>
<td>Tolerant</td>
<td>Intermediate</td>
<td>Yes</td>
<td>45</td>
<td>40</td>
<td>Rounded vase to broad oval</td>
<td>Green in spring, insignificant</td>
<td>Dark green</td>
<td>Yellow</td>
<td>No</td>
<td>Varieties are more hardy than parent species. Magnifica has similar growth habit to elm and improved insect resistance.</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>Ulmaceae</td>
<td>Celtis occidentalis</td>
<td>Chicagoland</td>
<td>Common Hackberry</td>
<td>3 Xeric to Min</td>
<td>Tolerant</td>
<td>Intermediate to Sensitive</td>
<td>Yes</td>
<td>45</td>
<td>35</td>
<td>Rounded vase, strong central leader</td>
<td>Green in spring, insignificant</td>
<td>Green</td>
<td>Yellow</td>
<td>Yes</td>
<td>Tolerant of urban growing conditions. Nilex gap may be an aesthetically issue. Inheritance of mechanical damage. Transplanted in spring (3B).</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Ulmaceae</td>
<td>Ulmus americana</td>
<td>Princeton</td>
<td>Princeton American Elm</td>
<td>4 Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>60</td>
<td>45</td>
<td>Upright vase</td>
<td>Insignificant</td>
<td>Dark glossy green</td>
<td>Yellow</td>
<td>Yes</td>
<td>Fast growing cultivar. Resistant to Dutch elm disease and elm leaf beetle. Per CSU elm trials, tree may be susceptible to scale. Prune to develop strong branching structure.</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Ulmaceae</td>
<td>Ulmus (wilsoniana x pumila 'Accolade') x carpelotum 'globosum'</td>
<td>Patriot</td>
<td>Patriot Elm</td>
<td>4 Mod</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Yes</td>
<td>45</td>
<td>35</td>
<td>Upright, narrow vase</td>
<td>Insignificant</td>
<td>Dark green</td>
<td>Yellow</td>
<td>No</td>
<td>Fast growth rate. Highly resistant to Dutch elm disease. Per CSU elm trials, tree may be susceptible to scale. Not as drought tolerant as other hybrids. Prune to develop strong branching structure.</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Ulmaceae</td>
<td>Ulmus glabra x carpelotum</td>
<td>Pioneer</td>
<td>Pioneer Elm</td>
<td>4 Mod</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Yes</td>
<td>50</td>
<td>45</td>
<td>Rounded</td>
<td>Insignificant</td>
<td>Dark green</td>
<td>Yellow</td>
<td>Yes</td>
<td>Cold hardy. Excellent resistance to Dutch elm disease. Highly susceptible to elm leaf beetle. Per CSU elm trials, tree may be moderately resistant to scale. Prune to develop strong branching structure.</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Ulmaceae</td>
<td>Ulmus pumila x japonica 'Chautauqua'</td>
<td>Morton-Glory</td>
<td>Triumph Elm</td>
<td>4 Min to mod</td>
<td>Tolerant</td>
<td>Intermediate</td>
<td>Yes</td>
<td>50</td>
<td>40</td>
<td>Upright oval to vase</td>
<td>Insignificant</td>
<td>Dark glossy green</td>
<td>Yellow</td>
<td>No</td>
<td>Cold hardy. Excellent resistance to Dutch elm disease. Highly susceptible to elm leaf beetle. Per CSU elm trials, tree may be moderately resistant to scale. Prune to develop strong branching structure.</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Ulmaceae</td>
<td>Ulmus japonica x wilsoniana</td>
<td>Morton</td>
<td>Accolade Elm</td>
<td>4 Min to mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>60</td>
<td>50</td>
<td>Vase with arching limbs</td>
<td>Insignificant</td>
<td>Dark glossy green</td>
<td>Yellow</td>
<td>Yes</td>
<td>Cold hardy. Resistant to Dutch elm disease and elm leaf beetle. Per CSU elm trials, tree may be susceptible to scale. Prune to develop strong branching structure.</td>
<td></td>
</tr>
<tr>
<td>92</td>
<td>Ulmaceae</td>
<td>Ulmus davidiana var japonica</td>
<td>Discovery</td>
<td>Discovery Elm</td>
<td>3 Mod</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>No</td>
<td>40</td>
<td>30</td>
<td>Upright oval to arching vase</td>
<td>Insignificant</td>
<td>Dark green</td>
<td>Yellow</td>
<td>Yes</td>
<td>Cold hardy. Resistant to Dutch elm disease and elm leaf beetle. Per CSU elm trials, tree may be moderately susceptible to scale. Prune to develop strong branching structure.</td>
<td></td>
</tr>
<tr>
<td>91</td>
<td>Ulmaceae</td>
<td>Ulmus pumila x holboellii x carpelotum</td>
<td>Homestead</td>
<td>Homestead Elm</td>
<td>5 Min to mod</td>
<td>Tolerant</td>
<td>Intermediate</td>
<td>No</td>
<td>50</td>
<td>30</td>
<td>Pyramidal to oval</td>
<td>Insignificant</td>
<td>Dark green</td>
<td>Yellow</td>
<td>No</td>
<td>Fast growing elm. Resistant to Dutch elm disease. Susceptible to elm leaf beetle. Per CSU elm trials, tree may be moderately resistant to scale. Prune to develop strong branching structure.</td>
<td></td>
</tr>
</tbody>
</table>
### Tree Candidates

#### Asymmetrical – Red Oak and Similar

<table>
<thead>
<tr>
<th>ID</th>
<th>Family</th>
<th>Botanical Name</th>
<th>Common Name</th>
<th>Acceptable Cultivar</th>
<th>Tree Type</th>
<th>Common Height</th>
<th>Minimum Spread (m)</th>
<th>Moisture Level</th>
<th>Hardiness Zone</th>
<th>Soil Salt Tolerance</th>
<th>Acidification</th>
<th>Growth Form</th>
<th>Flowers</th>
<th>Leaf Color – Spring</th>
<th>Leaf Color – Fall</th>
<th>Subject to Change</th>
<th>Additional Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>97</td>
<td>Ulmaceae</td>
<td>Ulmus parvifolia</td>
<td>Dynasty</td>
<td>Dynasty Elm</td>
<td>5</td>
<td>Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>35</td>
<td>35</td>
<td>Vase</td>
<td>Insufficient</td>
<td>Green</td>
<td>Yellow-orange</td>
<td>No</td>
<td>Fast growth rate. Resistance to Dutch elm disease, scale, and elm leaf beetle unknown. Prune to develop strong branching structure. Availability may be limited. Unproven in Denver region.</td>
</tr>
<tr>
<td>98</td>
<td>Ulmaceae</td>
<td>Ulmus parvifolia</td>
<td>Emerald</td>
<td>Emerald Elm</td>
<td>5</td>
<td>Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>45</td>
<td>30</td>
<td>Upright vase with arching branches</td>
<td>Insufficient</td>
<td>Green</td>
<td>Orange-red</td>
<td>Yes</td>
<td>High resistance to Dutch elm disease and elm leaf beetle. Resistance to scale unknown. Thrives in sunny locations. Prune to develop strong branching structure.</td>
</tr>
<tr>
<td>99</td>
<td>Ulmaceae</td>
<td>Ulmus parvifolia</td>
<td>Corticea</td>
<td>Cork Elm</td>
<td>6</td>
<td>Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>40</td>
<td>40</td>
<td>Vase</td>
<td>Insufficient</td>
<td>Dark green</td>
<td>Orange</td>
<td>No</td>
<td>Resistance to Dutch elm disease, scale, and elm leaf beetle unknown. Prune to develop strong branching structure. Availability may be limited. Unproven in Denver region.</td>
</tr>
<tr>
<td>100</td>
<td>Ulmaceae</td>
<td>Ulmus parvifolia</td>
<td>Dublins</td>
<td>Dublin Elm</td>
<td>6</td>
<td>Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>50</td>
<td>35</td>
<td>Upright, arching branches</td>
<td>Insufficient</td>
<td>Green</td>
<td>Yellow-orange</td>
<td>No</td>
<td>Growth rate is fastest of zelkova cultivars. Tolerant of urban conditions. Susceptible to canker from mechanical injury. Plant in spring. Prune in fall to develop strong branching structure.</td>
</tr>
<tr>
<td>101</td>
<td>Ulmaceae</td>
<td>Zelkova serrata</td>
<td>Hikoki</td>
<td>Japanese Elm</td>
<td>5</td>
<td>Xeric to Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>45</td>
<td>30</td>
<td>Vase, upright arching branches</td>
<td>Insufficient</td>
<td>Green</td>
<td>Orange</td>
<td>No</td>
<td>Fast growth rate. Requires cold hardy cultivars for Denver region. Tolerant of urban conditions. Susceptible to canker from mechanical injury. Prune in fall to develop strong branching structure.</td>
</tr>
<tr>
<td>102</td>
<td>Ulmaceae</td>
<td>Zelkova serrata</td>
<td>Green Vase</td>
<td>Green Vase Elm</td>
<td>5</td>
<td>Xeric to Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>45</td>
<td>30</td>
<td>Vase, upright arching branches</td>
<td>Insufficient</td>
<td>Green</td>
<td>Orange</td>
<td>No</td>
<td>Fast growth rate. Requires cold hardy cultivars for Denver region. Tolerant of urban conditions. Susceptible to canker from mechanical injury. Prune in fall to develop strong branching structure.</td>
</tr>
<tr>
<td>103</td>
<td>Ulmaceae</td>
<td>Zelkova serrata</td>
<td>Chinese Zelkova</td>
<td>Chinese Elm</td>
<td>5</td>
<td>Xeric to Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>35</td>
<td>35</td>
<td>Vase</td>
<td>Insufficient</td>
<td>Dark green</td>
<td>Yellow-orange</td>
<td>No</td>
<td>Resistance to elm leaf beetles. Exfoliating cinnamon-colored bark. Prune in fall to develop strong branching structure. Availability may be limited. Unproven in Denver region.</td>
</tr>
</tbody>
</table>
Attachment 9
Map Book Project Limits
Map Book 4
Historic Properties and Project Limits
16th Street Mall
March 2019

LEGEND
- Area of Potential Effects
- Project Limits
- Historic Properties
- Historic District

0 100 200 300 Feet
LEGEND
- Area of Potential Effects
- Project Limits
- Historic Properties
- Historic District
Appendix B
16th Street Mall Alternatives Analysis Report
1. Project Background

The National Environmental Policy Act (NEPA) directs transportation officials to consider balancing engineering and transportation needs with social, economic, and natural environmental factors in making project decisions. A group of partners comprising the Regional Transportation District (RTD), City and County of Denver (CCD), Downtown Denver Partnership (DDP) and Federal Transit Administration (FTA) (the Project Partners), propose to implement improvements to the 16th Street Mall (Mall) to address infrastructure, mobility, safety, and public use needs. The Mall is Denver’s busiest transit artery and premier public space, and one of the longest pedestrian and transit malls in the world. The Mall today is a hub for mobility and economic activity in downtown Denver. The Environmental Assessment (EA) documents the NEPA process for the 16th Street Mall Alternative Analysis and Environmental Clearance Project (Project) in accordance with 23 Code of Federal Regulations 771. The NEPA process is required for the Project because federal funds constitute a portion of the Project’s funding.

2. Purpose of this Report

The purpose of this report is to document the development and evaluation of the range of alternatives considered for the Mall and identify a Locally Preferred Alternative (LPA) to best serve the needs of the study area and stakeholders. This report includes a description of the Project limits, study area and prior planning studies, and a review of the alternatives considered, the evaluation process, and the recommended LPA.

3. Project Limits and Study Area

The Project limits are defined as the full 80-foot width of the Mall, building face to building face between Market Street at the western Project limit and Broadway at the eastern Project limit, and including the portion of cross streets that intersect with the Mall’s footprint. These Project limits encompass the portion of the Mall constructed in 1982, which connected RTD’s Market Street and Civic Center bus stations. In recent years, the Free MallRide service has been
expanded farther west along 16th Street to the renovated and revitalized Denver Union Station (DUS), a hub that connects free MallRide passengers to light rail, commuter rail, and local and regional bus connections. The study area for the EA extends beyond the Project limits to include the area between DUS on the west, Civic Center Station (CCS) on the east, 15th Street on the south, and 17th Street on the north. **Figure 3-1** shows the boundary of the EA study area as well as the Project limits.

*Figure 3-1. Project Limits and Study Area*
4. Prior Planning and Past Studies

Since 2007, many studies and proposals for rehabilitation have been conducted by RTD and CCD to address the Mall’s aging infrastructure and other issues, but none has resulted in a comprehensive rehabilitation of the Mall. **Table 4-1** summarizes past studies that are important to the development of this Project. The *Summary of Previous Studies Relevant to 16th Street Mall Alternatives Analysis and Environmental Clearance* located in **Appendix A** of the EA provides greater detail about each study.

**Table 4-1. Summary of Past Studies**

<table>
<thead>
<tr>
<th>Name of Study (Author)</th>
<th>Year</th>
<th>Applicability to Current NEPA Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>The Transitway/Mall: A Transportation Project in the Central Business District of Metropolitan Denver</em> (I.M Pei and Partners, Architects and Planners)</td>
<td>1977</td>
<td>Design concept for the Mall. This concept became the Transitway/Mall Alternative in the 1978 EA.</td>
</tr>
<tr>
<td><em>Downtown Multimodal Access Plan</em> (CCD et al.)</td>
<td>2005</td>
<td>Established the Mall shuttle service as the cornerstone of downtown Denver’s public transportation system and assumed continued shuttle service as part of the recommendations through 2025.</td>
</tr>
<tr>
<td><em>Denver Downtown Area Plan</em> (CCD et al.)</td>
<td>2007</td>
<td>Comprehensive local planning document that guides downtown development. The plan provides recommendations to strengthen the vitality of the Mall, including enhancing subdistricts, developing a retail strategy, and conducting a study to assess infrastructure and reconstruction of the Mall.</td>
</tr>
<tr>
<td><em>An Advisory Services Panel Report: 16th Street Mall, Denver, Colorado: Building on Success</em> (Urban Land Institute)</td>
<td>2008</td>
<td>As recommended by the <em>Downtown Area Plan</em>, an assessment was performed to explore the Mall’s audience, recommend retail and nonretail strategies to support the urban environment, evaluate dividing the Mall into subdistricts, advise on infrastructure upgrades, and recommend future land use.</td>
</tr>
<tr>
<td>Name of Study (Author)</td>
<td>Year</td>
<td>Applicability to Current NEPA Study</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------------</td>
<td>-------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>16th Street Technical Assessment and Rehabilitation Study (BID et al.); 16th Street Urban Design Plan: Concept Design Report (CCD et al.)</td>
<td>2009; 2010</td>
<td>As recommended by the Downtown Area Plan, an assessment of the existing physical conditions of the Mall and recommendations for the future. The plan recommended that, based on availability of funding, the proposed action should maintain and renovate the existing asymmetrical and median block configuration; renovate and reconfigure furnishings to support public use, pedestrian circulation, and ADA compliance in pedestrian areas; replant missing trees; upgrade power outlets; renovate or replicate lighting; renovate and repair water features including amenities and irrigation; and construct bulb-outs (curb extensions) at intersections.</td>
</tr>
<tr>
<td>16th Street Mall Pilot Repair Project (Atkinson)</td>
<td>2011 (report finished in 2014)</td>
<td>Study to provide feedback on condition of paving system and maintenance records, and conduct pilot project to observe rehabilitation techniques. The study provided operations and maintenance recommendations, such as spreading wheel loads and also using a particular type of mortar to secure pavers that require maintenance.</td>
</tr>
<tr>
<td>Categorical Exclusion: 16th Street Mall Transitway Rehabilitation (RTD)</td>
<td>2013</td>
<td>Approved NEPA document for a project to rehabilitate and reconstruct a portion of the Mall from Market to Lawrence Streets, and Court Place to Broadway, using methods tested through the pilot paver program. The project was not constructed because of cost considerations.</td>
</tr>
<tr>
<td>Downtown Denver 16th Street Mall: Small Steps Towards Big Change (Gehl)</td>
<td>2014/2015 (report finished in 2016)</td>
<td>Assessment of the existing social conditions of the Mall and recommendations for the future. The study found the spatial configuration and shuttle frequency on median blocks limits public use; pedestrian volumes exceed capacity during peak hours, and pedestrians need more walking space; expanded patios were the most successful generators of (nonwalking) public activity on the Mall, which in turn draws more visitors, creates a greater feeling of safety, and increases retail potential.</td>
</tr>
<tr>
<td>Transitway Rehabilitation Study (RTD)</td>
<td>2015</td>
<td>After the 2013 Mall rehabilitation project was not implemented, this 2016 study was started to identify and evaluate surface material alternatives for rehabilitation of the Mall transitway. A preferred alternative was not selected, and the study was stopped. The Section 106 consultation process begun for the Transitway Rehabilitation Study has been reinitiated for the EA.</td>
</tr>
</tbody>
</table>

Note: ADA = Americans with Disabilities Act of 1990
5. Range of Alternatives Considered

Taking into account prior planning activities and planning studies and public and stakeholder input, the Project Partners developed a range of alternatives for evaluation based on their ability to meet the Project’s Purpose and Need and other evaluation criteria, such as costs and community and environmental impacts, while retaining historic design features. The historic design includes three sections of the Mall, often referred to as a beginning, middle, and end:

- Three asymmetrical blocks on the western end of the Mall from Market Street to Arapahoe Street, with the transit ways—separated by a small, 6-foot median with light standards—offset from the center of the Mall, creating a wider public space on one side of the Mall than the other.
- Seven symmetrical median blocks in the middle of the Mall from Arapahoe Street to Tremont Place, with a median in the center between the transit ways.
- Two asymmetrical blocks on the eastern end of the Mall from Tremont Place to Cleveland Place, in the same configuration as described for the western end of the Mall, and a half-block plaza (Gateway Plaza) between Cleveland Place and Broadway where the downtown and city street grids converge.

Five build alternatives, with varied configurations of the transit way, amenity zone (in some cases found in a central median), pedestrian walkway, patio/gathering area, and tree placement, were developed and are illustrated on Figure 5-3, along with the existing configuration of the Mall (the No Build Alternative) for comparison. Alternatives that did not meet the Project purpose and need were eliminated. A discussion of why the eliminated alternatives did not meet the purpose and need is found in this section. The Center Running and New Asymmetrical Alternative was selected as the LPA and advanced to the detailed environmental impact analysis in the EA. The following sections describe the alternatives developed and considered for the Project.

A. No Build Alternative

The No Build Alternative cross-section design is the same as the existing cross-section design and has two cross-section designs, Existing Median and Existing Asymmetrical. Figure 5-1 illustrates the existing cross-section designs and shows to which blocks the cross sections apply.
Figure 5-1. Existing Cross-section Design

In addition to maintaining the existing alignment of the Mall, the No Build Alternative represents future conditions without the construction and operation of the Project. The No Build Alternative includes the current transportation system with all committed transportation improvements in the 2018-2021 Regional Transportation Improvement Program (TIP) and fiscally constrained 2040 Regional Transportation Plan (RTP). The 2018-2021 TIP includes funds to maintain the Mall transit way (TIP-ID: 1999-052) from Market Street to Broadway as well as the transfer facilities at Union Station and CCS and State of Good Repair funding for high-intensity bus stock. The 2018-2021 TIP also includes funds for the reconstruction of the Mall from Arapahoe Street to Lawrence Street (TIP-ID: 2016-028); however, these funds will be repurposed for geotechnical and underground surveys as part of a subsequent LPA design phases. The 2040 RTP includes improvements throughout RTD’s transit system that are projected to increase transit ridership in downtown Denver. Ridership increases are expected.
to be accommodated through continued operation of the Free MallRide on the Mall and the Free MetroRide on 18th and 19th Streets, and continued fare service on bus, light rail, and commuter rail routes.

In addition to programmed transit way improvements, the No Build Alternative includes standard maintenance activities (for example, trash pickup, power washing, snow removal, landscaping, and plumbing and electrical maintenance), targeted repairs (for example, granite paver, grout, driveway, and electrical and plumbing repairs), and continued implementation of safety strategies (including DDP’s Security Action Plan) along the Mall. Maintenance responsibilities have been determined by intergovernmental agreements (IGA). CCD and RTD have an IGA through 2022 in which RTD provides shared maintenance services for the transit way portion of the Mall. Maintenance activities for areas outside of the transit way are implemented by DDP as part of an ongoing year-to-year IGA with CCD.

The No Build Alternative does not meet the Purpose and Need for the Project, but is retained as a basis for comparison of the environmental impacts of the LPA.

B. Build Alternatives

The Project Partners developed a range of alternatives based on the Project purpose and need, which includes various design elements. These design elements comprise both physical and operational elements and are summarized in Table 5-1. Five build alternatives were developed from these design elements; four of the build alternatives were evaluated in the Level 1 evaluation, and one of the build alternatives—Partial Repair—was added after the Level 1 evaluation (Figure 5-3).
With the exception of the Rebuild in Existing Condition Alternative and Partial Repair Alternative, the spatial configuration of each build alternative was developed using the following design standards:

- Transit way – Minimum 12 feet wide or 24 feet wide, when combined into a single transit way (includes a 2-foot-wide edge zone at the back of the curb)
- Pedestrian walkway – Minimum 10 feet wide
- Patio/gathering area – Minimum 9 feet wide
- Trees – Ideal distance between tree and transit way of 5 feet; this distance may be reduced to accommodate other requirements

All build alternatives maintain current and planned Free MallRide service levels on the Mall. RTD’s service plans and Denver’s Downtown Multimodal Access Plan (CCD et al., 2005) establish the Free MallRide service as a critical element in Denver’s transit system. Moving the Free MallRide service to parallel streets into either mixed traffic or a dedicated transit way would prevent RTD from providing the needed level of transit service and connectivity, and downtown traffic operations would degrade. The Free MetroRide on 19th and 20th Streets is a parallel
service, but cannot replace the Free MallRide because of its operation in mixed traffic and its location.

Although several design elements were studied that would change transit operations on the Mall, these design elements were not carried forward into the range of build alternatives. Reduced transit service on the Mall could not be implemented as a matter of sound traffic engineering judgement because RTD cannot meet its service requirements and ridership demand through service on parallel city streets. The Free MallRide shuttle was originally designed as a free transit shuttle bus between DUS and CCS, the major transfer stations in metro Denver. Placing the transit service on the Mall decreased the number of buses on downtown streets by funneling express and regional commuter buses to bus terminals. Today, routes along the Mall eliminate approximately 870 daily bus trips on downtown streets (Marsella, 2008, pers. comm.), reducing congestion in the downtown area. Current Free MallRide ridership is approximately 39,000, and is projected to increase to 70,000 in 2035. Reducing service on the Mall would require shifting a portion of the current ridership and all projected ridership to another bus route. Providing bus service on parallel streets, such as the Free MetroRide currently operating on 18th and 19th streets, provides a slower trip and out-of-direction travel, and would not be able to accommodate RTD’s current and projected ridership demands.

All build alternatives would comply with federal requirements and meet standards such as ADA requirements and RTD’s Bus Infrastructure Design Guidelines and Criteria (RTD, 2016a) and Bus Infrastructure Standard Drawings (RTD, 2016b), and CCD public works standards for design and streetscapes (CCD, 2017a). Some minor adaptations of the standards may be needed as the Project is designed in more detail.

**Table 5-1. Design Elements Considered in Development of Range of Alternatives**

<table>
<thead>
<tr>
<th>Problem</th>
<th>Design Elements</th>
<th>Disposition to Carry Forward into Build Alternatives&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failing and Outdated Infrastructure</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Failing pavement system in constant need of repair</td>
<td>• Continue existing operations and maintenance program</td>
<td>• Carried forward for No Build</td>
</tr>
<tr>
<td></td>
<td>• New pavement mortar</td>
<td>• Carried forward for Alternatives A through E</td>
</tr>
<tr>
<td></td>
<td>• New sub-base</td>
<td>• Carried forward for Alternatives A through E</td>
</tr>
<tr>
<td></td>
<td>• Clean and reset existing pavers</td>
<td>• Carried forward for Alternative E</td>
</tr>
<tr>
<td></td>
<td>• Replace pavement system</td>
<td>• Carried forward for Alternatives A through D</td>
</tr>
<tr>
<td></td>
<td>• Install new granite pavement system</td>
<td>• Carried forward as pavement option for Alternatives A through D</td>
</tr>
<tr>
<td>Failing pavement system in constant need of repair</td>
<td>• Install different material pavement system with low maintenance requirements</td>
<td>• Carried forward as pavement option for Alternatives A through D</td>
</tr>
<tr>
<td>Problem</td>
<td>Design Elements</td>
<td>Disposition to Carry Forward into Build Alternatives$^a$</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------</td>
</tr>
<tr>
<td>need of repair (continued)</td>
<td>• Replace buses with smaller, lighter buses to reduce loads</td>
<td>• Not carried forward, does not meet operational requirements</td>
</tr>
<tr>
<td>Outdated infrastructure (tree boxes, fountains, lack of water quality</td>
<td>• New underground tree infrastructure</td>
<td>• Carried forward for Alternatives A through D</td>
</tr>
<tr>
<td>treatment and modern fiber optic and communications utilities) leads</td>
<td>• Replace failing/missing trees in current infrastructure</td>
<td>• Carried forward for Alternative E</td>
</tr>
<tr>
<td>to poor tree health and doesn’t meet modern day needs</td>
<td>• Construct water quality treatment features</td>
<td>• Carried forward for Alternatives A through D</td>
</tr>
<tr>
<td></td>
<td>• Install modern fiber optic/communications utilities and additional electric power</td>
<td>• Carried forward for Alternatives A through D</td>
</tr>
<tr>
<td></td>
<td>• New/updated fountains</td>
<td>• Carried forward for Alternatives A through E</td>
</tr>
<tr>
<td></td>
<td>• New furnishing reflecting current practices for safety/security</td>
<td>• To be considered during final design</td>
</tr>
<tr>
<td>Poor delineation between pedestrian walks and transit causes collisions</td>
<td>• Retain existing 4-inch curb</td>
<td>• Carried forward for Alternative E; carried forward as a design option for Alternatives A through D</td>
</tr>
<tr>
<td>and near misses</td>
<td>• Add higher curb between walks and transit</td>
<td>• Carried forward as a design option for Alternatives A through D</td>
</tr>
<tr>
<td></td>
<td>• Shift walks to storefront area</td>
<td>• Carried forward as a design option for Alternatives A through D</td>
</tr>
<tr>
<td></td>
<td>• Add trees, lights, other furnishings between walks and transit</td>
<td>• Carried forward for Alternatives B and C</td>
</tr>
<tr>
<td></td>
<td>• Visually delineate walks and transit with different materials/colors</td>
<td>• Carried forward as a design option for Alternatives A through D</td>
</tr>
<tr>
<td></td>
<td>• Use technology to delineate walks and transit, such as colored lights</td>
<td>• Carried forward as a design option for Alternatives A through D</td>
</tr>
<tr>
<td></td>
<td>• Add barrier/bollards between walks and transit</td>
<td>• Carried forward as a design option for Alternatives A through D</td>
</tr>
<tr>
<td>Slick pavement surface causes pedestrian slips and falls, bus traction</td>
<td>• Add grooves to granite in transit way</td>
<td>• To be considered during final design</td>
</tr>
<tr>
<td>problems</td>
<td>• Refinish or replace granite with different finish</td>
<td>• Carried forward as pavement option for Alternatives A through D</td>
</tr>
<tr>
<td></td>
<td>• Use different material with higher friction</td>
<td>• Carried forward as pavement option for Alternatives A through D</td>
</tr>
<tr>
<td>Problem</td>
<td>Design Elements</td>
<td>Disposition to Carry Forward into Build Alternatives&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------</td>
</tr>
<tr>
<td>Higher crash numbers at cross-street intersections adjacent to median blocks (Arapahoe to Tremont)</td>
<td>• Install physical barrier to prevent crossing between medians and consolidate crossing points to sidewalks</td>
<td>Carried forward as a design option for Alternatives A, D, and E</td>
</tr>
<tr>
<td></td>
<td>• Install signage to prevent crossing between medians and consolidate crossing points to sidewalks</td>
<td>Carried forward as a design option for Alternatives A, D, and E</td>
</tr>
<tr>
<td></td>
<td>• Eliminate median and consolidate crossing points to sidewalks</td>
<td>Carried forward for Alternatives B and C</td>
</tr>
<tr>
<td></td>
<td>• Construct bulb-outs at intersections to reduce cross street width</td>
<td>Carried forward for Alternatives A through E</td>
</tr>
<tr>
<td>Maintain Mall transit operations</td>
<td>• Accommodate bidirectional transit operations to 2035 and beyond</td>
<td>Carried forward for all alternatives</td>
</tr>
<tr>
<td></td>
<td>• Provide 12-foot-wide bus lanes</td>
<td>Carried forward for all alternatives</td>
</tr>
<tr>
<td></td>
<td>• Use parallel, center-running lanes to simplify bus operations</td>
<td>Carried forward for Alternative B</td>
</tr>
<tr>
<td></td>
<td>• Maintain space for two back-to-back buses at each shuttle stop to accommodate increased service needs</td>
<td>Carried forward for all alternatives</td>
</tr>
<tr>
<td></td>
<td>• Maintain service levels and shift new ridership to Free MetroRide</td>
<td>Not carried forward, Free MetroRide service is slower than Free MallRide and cannot meet additional Mall ridership demand</td>
</tr>
<tr>
<td>Frequent maintenance disrupts transit operations, and would be more disruptive as ridership grows</td>
<td>• New pavement mortar</td>
<td>Carried Forward for Alternatives A through E</td>
</tr>
<tr>
<td></td>
<td>• New sub-base</td>
<td>Carried forward for Alternatives A through E</td>
</tr>
<tr>
<td></td>
<td>• Replace pavement system</td>
<td>Carried forward for Alternatives A through E</td>
</tr>
<tr>
<td></td>
<td>• Install new granite pavement system</td>
<td>Carried forward as pavement option for Alternatives A through D</td>
</tr>
<tr>
<td></td>
<td>• Install different material pavement system with low maintenance requirements</td>
<td>Carried forward as pavement option for Alternatives A through D</td>
</tr>
<tr>
<td>Problem</td>
<td>Design Elements</td>
<td>Disposition to Carry Forward into Build Alternatives</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Problem Design Elements</strong></td>
<td><strong>Disposition to Carry Forward into Build Alternatives</strong></td>
<td></td>
</tr>
<tr>
<td>- Build third transit way to maintain operations during maintenance</td>
<td>- Not carried forward, will not meet program needs for flexibility</td>
<td></td>
</tr>
<tr>
<td><strong>Sidewalks are too small for pedestrian volumes</strong> and CCD standards</td>
<td><strong>Sidewalks are too small for pedestrian volumes</strong> and CCD standards</td>
<td></td>
</tr>
<tr>
<td>- Widen sidewalks by removing or narrowing patio and gathering areas</td>
<td>- Carried forward for Alternatives A, D, and E; does not meet requirements for patio size</td>
<td></td>
</tr>
<tr>
<td>- Widen sidewalks by moving transit ways</td>
<td>- Carried forward for Alternatives A through C</td>
<td></td>
</tr>
<tr>
<td>- Widen sidewalks by narrowing transit ways</td>
<td>- Not carried forward, does not meet bus operation requirements</td>
<td></td>
</tr>
<tr>
<td><strong>Physical separation of median from primary pedestrian walks</strong></td>
<td><strong>Physical separation of median from primary pedestrian walks</strong></td>
<td></td>
</tr>
<tr>
<td>- Increase size of medians</td>
<td>- Not carried forward, does not provide adequate sidewalk and patio space next to buildings</td>
<td></td>
</tr>
<tr>
<td>- Decrease transit service frequency and shift ridership to Free MetroRide</td>
<td>- Not carried forward, Free MetroRide service is slower than Free MallRide and cannot meet additional Mall ridership demand</td>
<td></td>
</tr>
<tr>
<td>- Remove/reduce medians where possible and consolidate space against buildings</td>
<td>- Carried forward for Alternatives B and C</td>
<td></td>
</tr>
<tr>
<td><strong>Limited usability of narrow sides of asymmetrical blocks</strong></td>
<td><strong>Limited usability of narrow sides of asymmetrical blocks</strong></td>
<td></td>
</tr>
<tr>
<td>- Widen sidewalks by moving transit ways</td>
<td>- Carried forward for Alternatives A through C</td>
<td></td>
</tr>
<tr>
<td>- Widen sidewalks by narrowing transit ways</td>
<td>- Not carried forward, does not meet bus operation requirements</td>
<td></td>
</tr>
<tr>
<td><strong>Less than 1 percent of Mall users stop to spend time on the Mall</strong></td>
<td><strong>Less than 1 percent of Mall users stop to spend time on the Mall</strong></td>
<td></td>
</tr>
<tr>
<td>- Install closed-circuit television (CCTV) and/or other surveillance measures to increase security</td>
<td>- Applicable to Alternatives A through D</td>
<td></td>
</tr>
<tr>
<td>- Maintain/improve security and police presence</td>
<td>- Applicable to all alternatives; current police budget does not allow dedicated officers to Mall</td>
<td></td>
</tr>
<tr>
<td>- Provide more active programming of Mall</td>
<td>- Applicable to all alternatives</td>
<td></td>
</tr>
</tbody>
</table>
Problem Design Elements

<table>
<thead>
<tr>
<th>Problem</th>
<th>Design Elements</th>
<th>Disposition to Carry Forward into Build Alternativesa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install more seating, furniture, interactive installations on blocks without it</td>
<td>To be considered during final design</td>
<td></td>
</tr>
<tr>
<td>Redirect pedestrians to storefront areas</td>
<td>Carried forward for Alternatives B and C</td>
<td></td>
</tr>
</tbody>
</table>

a Build Alternatives: A – Median and New Asymmetrical; B –Center Running; C –Center Running and New Asymmetrical; D – Rebuild in Existing Configuration; E – Partial Repair.

b Existing (2015) midday peak pedestrian volumes are 3,000 pedestrians per hour Lawrence to Arapahoe (near Denver Union Station neighborhood) and 3,900 pedestrians per hour Welton to Glenarm (Central Business District neighborhood) (Gehl, 2016). Future (2040) minimum midday peak pedestrian volumes are estimated at 4,600 pedestrians per hour in CBD neighborhood and 4,000 pedestrians per hour in DUS neighborhood, based on existing peak hour pedestrian volumes growing at rate of forecasted employment growth from 2015 to 2040 of 0.7 percent annually in the Central Business District (CBD) neighborhood and 1.2 percent annually in the DUS neighborhood (Table 4 of the Land Use and Socioeconomic Existing Conditions technical memorandum located in Appendix B).


d The architectural standard for dining space recommends 300 square inches per diner. Common industry table sizes that meet this standard are 30 inches by 42 inches and 30 inches by 48 inches for four-person tables and 30 inches by 24 inches for two-person tables. The standard aisle width is 36 inches to 42 inches. Using the smallest industry standards of 42-inch-wide four-top table, 36-inch aisle, and 24-inch-wide two-top table results in a patio width of 102 inches, or 8.5 feet, without a barrier railing, and 9 feet with a barrier railing. Additionally, patio permits currently issued by BID require 10 feet of separation from transit ways, resulting in 9-foot patios.

e Eighty-eight percent of panhandling occurs on median blocks (Downtown Denver BID Downtown Ambassadors, 16th Street Mall Panhandling Surveys, March 22 – August 29, 2015 as cited in Gehl, 2016).

f Activating public space is essential to the perception of safety: when more people gather outside, sense of safety increases and negative social behaviors decrease. Patio seating draws more people to gather on the Mall than any other activity (Gehl, 2016).

g Since DDP implemented a security program with private security officers in 2014, crime has decreased 29 percent on the Mall. There are approximately 1,500 crimes on the Mall per year on average for 2014-2016 (Denver Police Department, crime statistics on the 16th Street Mall, January 2017).

BID = Business Improvement District
ROW = right-of-way

1. Median and New Asymmetrical Alternative

The Median and New Asymmetrical Alternative is described using the five following Project elements:

a) Cross-section Design

This alternative uses two primary cross-section designs. The cross-section designs and extent of each cross-section design on the Mall are illustrated on Figure 5-3. The median cross-section design would be the same as the existing median cross-section design. The new asymmetrical
cross-section design would be slightly different from the existing asymmetrical cross-section design. The new asymmetrical cross-section design removes the 6-foot median with light fixtures from between the transit ways, pushes the two transit ways together, and increases the size of the sidewalk on the narrow side of the cross section from 17 feet to 19 feet to provide an adequately sized pedestrian walking area. The Gateway Plaza configuration (Figure 5-2) could be implemented between Cleveland Place and Broadway to preserve the existing design of that half-block.

b) Infrastructure
This alternative replaces all of the infrastructure on the Mall, including the following:

- Remove and replace existing concrete sub-base slab under transit ways
- Replace existing pavement system
- Install new underground tree infrastructure (tree boxes or continuous trenches, irrigation system, and tree openings/grates)
- Install stormwater quality treatment features
- Replace existing utilities and install new fiber optic/communications utilities, including wifi, and additional electrical power supply
- Update or install new water fountains

c) Intersection Design
This alternative would not change any traffic operations at intersections. Capacity, lane width, and traffic controls and timing would remain the same. Intersections would be reconstructed, and would include safety improvements such as new walkway designs and curb extension bulb-outs.

d) Materials and Pattern
This alternative could be implemented with any of the five pavement options studied:

- Granite pavers with a mortar setting for transit ways and sidewalks, in similar color and pattern as existing conditions or new pattern
- Unit pavers with a sand setting for transit ways, granite pavers for sidewalks, in similar color and pattern as existing conditions or new pattern
- Precast concrete slabs with pattern and color for transit ways, granite pavers for sidewalks, in similar color and pattern as existing conditions or new pattern
- Cast-in-place concrete robust enough to not require replacement over the life of the Project, with no pattern or color for transit ways, granite pavers for sidewalks
- Cast-in-place concrete with less longevity and requiring at least one replacement over the life of the Project, with no pattern or color for transit ways, granite pavers for sidewalks

e) Bus Operations
This alternative would allow for continued Free MallRide service on the Mall in the same manner that it exists today and would not preclude operational changes in transit service along the Mall.
f) **Safety and Security**

Treatments or design elements to delineate the transit way from sidewalks will be decided during subsequent design phases and could be implemented with any of the previously listed pavement types. This alternative would also allow for continued implementation of DDP’s Downtown Security Action Plan (2016). **Section 7** of this technical memorandum describes crime prevention through environmental design (CPTED) principles included in the Project description. The following bullets describe how each cross-section design incorporates CPTED principles:

- Median cross-section design: This cross-section design would maintain the existing median block cross-section design, which restricts natural surveillance, territoriality, and the ability to manage pedestrian use for the entire width of the Mall because the transit ways and buses provide a real and perceived barrier.

- New asymmetrical cross-section design: This cross-section design promotes natural surveillance, territoriality, and provides the ability to manage pedestrian use for the entire width of the Mall because no real or perceived barriers exist.

2. **Center Running Alternative**

The Center Running Alternative is described using the five Project elements described in this section.

a) **Cross-section Design**

This alternative uses one cross-section design for the full length of the Project. The center-running cross-section design is illustrated on **Figure 5-3**. The center-running cross-section design places the two, 12-foot-wide transit ways adjacent to each other, without a median separating them. Because the space needed for the medians is relocated, and the alignment is symmetrical, the cross-section design has equal amounts of sidewalk space (28 feet) on each side of the center-running transit lines. The Gateway Plaza configuration (**Figure 5-2**) could be implemented between Cleveland Place and Broadway to preserve the existing design of that half-block.

b) **Infrastructure**

Refer to description under Median and New Asymmetrical Alternative.

c) **Intersection Design**

Refer to description under Median and New Asymmetrical Alternative.

d) **Materials and Pattern**

Refer to description under Median and New Asymmetrical Alternative.

e) **Bus Operations**

Refer to description under Median and New Asymmetrical Alternative.

f) **Safety and Security**

Treatments or design elements to delineate the transit way from pedestrian walking areas will be decided during subsequent design phases and could be implemented with any of the pavement types listed in this technical memorandum. This alternative would also allow for
continued implementation of DDP’s Downtown Security Action Plan. Section 7 of this technical memorandum describes CPTED principles included in the Project description. The center-running cross-section design would remove the existing median block cross-section design and utilize CPTED principles. By removing the median blocks and relocating that space outside of the transit way, the design promotes natural surveillance and territoriality, and increases the ability to manage pedestrian use for the entire width of the Mall because no real or perceived barriers exist.

3. Center Running and New Asymmetrical Alternative

The Center-running and New Asymmetrical Alternative is described using the five following Project elements:

a) Cross-section Design

This alternative uses two primary cross-section designs. The center-running cross-section design would be the same as described under the Center Running Alternative. Through the Level 1 and Level 2 evaluations, the new asymmetrical cross-section design was the same as described under the Median and New Asymmetrical Alternative. After the Level 2 screening, the new asymmetrical cross section was refined to better meet the Project needs and goals. The cross-section designs and extent of each cross-section design on the Mall are illustrated on Figure 5-3. The Gateway Plaza configuration (Figure 5-2) could be implemented between Cleveland Place and Broadway to preserve the existing design of that half-block.

b) Infrastructure

Refer to description under Median and New Asymmetrical Alternative.

c) Intersection Design

Refer to description under Median and New Asymmetrical Alternative.

d) Materials and Pattern

Refer to description under Median and New Asymmetrical Alternative.

e) Bus Operations

Refer to description under Median and New Asymmetrical Alternative.

f) Safety and Security

Refer to description under Center Running Alternative.

4. Rebuild in Existing Configuration

The Rebuild in Existing Configuration Alternative is described using the following five Project elements:

a) Cross-section Design

This alternative maintains the existing cross-section design. Refer to description of the existing cross-section design under No Build Alternative.

b) Infrastructure

Refer to description under Median and New Asymmetrical Alternative.
c) Intersection Design
Refer to description under Median and New Asymmetrical Alternative.

d) Materials and Pattern
Refer to description under Median and New Asymmetrical Alternative.

e) Bus Operations
Refer to description under Median and New Asymmetrical Alternative.

f) Safety and Security
Refer to description under Median and New Asymmetrical Alternative.

5. Partial Repair

The Partial Repair Alternative is based on the recommendation proposed in the *16th Street Urban Design Plan* (CCD et al., 2010) and is described using the five Project elements:

a) Cross-section Design
This alternative maintains the existing cross-section design. Refer to description of the existing cross-section design under No Build Alternative.

b) Infrastructure
This alternative replaces the following infrastructure:

- Renovates existing granite paver system, as described in Materials and Pattern; however, doesn't improve sub-base concrete slab under transit way
- Upgrade surface utilities, including power outlets, where needed
- Replaces failing trees, retains existing tree box infrastructure
- Renovates and reconfigures furnishings to support public use, pedestrian circulation, and ADA compliance in pedestrian areas
- Renovates and repairs water features including fountains and irrigation

c) Intersection Design
Refer to description under Median and New Asymmetrical Alternative.

d) Materials and Pattern
This alternative would be implemented by reusing the existing granite pavers. In the transit ways, the process would include cataloging the existing pattern, removing the existing pavers, cleaning and refinishing the pavers, and then resetting the pavers in their original location. In the pedestrian areas, the pavers would not be removed, but they would be refinished. The result would be a renovation of the existing paver system.

e) Bus Operations
Refer to description under Median and New Asymmetrical Alternative.

f) Safety and Security
Refer to description under Median and New Asymmetrical Alternative.
6. Evaluation Process and Results

A two-step process (referred to as Level 1 and Level 2) evaluated the alternatives. Level 1 evaluated the alternatives on criteria related to Project purpose and need factors, while Level 2 further screened the alternatives on purpose and need factors and on costs, safety, mobility, public use, and community and environmental impacts.

A. Level 1 Evaluation

Four of the five build alternatives were analyzed in the Level 1 evaluation, along with the No Build Alternative. The Partial Repair alternative was added to the range of alternatives, based on stakeholder input, after the Level 1 evaluation was complete. The Level 1 evaluation qualitatively assessed the alternatives against the following criteria related to the Purpose and Need:

- Infrastructure
- Safety
- Mobility
- Public Use
- Social and Environmental Impacts
- Cost
- Construction

Table 6-1 details the performance of each build alternative and the No Build Alternative against the evaluation criteria.

Conclusions. The Level 1 evaluation concluded that the No Build Alternative would not meet the Project purpose and need, and the Median and New Asymmetrical Alternative and the Rebuild in Existing Configuration Alternative would not meet the Project needs for mobility, safety, and public use. However, no alternatives were eliminated from consideration after the Level 1 evaluation. Although the No Build Alternative would not meet the Project purpose and need, it is carried forward as a baseline for comparison of the build alternatives.

Public input received on the Level 1 evaluation included suggestions to include a bike lane in the alternatives, move transit service off of the Mall, and add an alternative similar to the recommendation of the 2010 16th Street Urban Design Plan (CCD et al.).

- Bike lanes were not included in the build alternatives for two reasons: RTD operates the transit way as a fixed guideway supported by federal funding, and federal regulations prevent the operation of other transportation modes in a fixed guideway; and CCD has planned and implemented a downtown bicycle network that recognizes the Mall as a dedicated transit way and has bicycle lanes on parallel streets.

- Moving transit off the Mall would have ripple effects through the downtown and regional transit system, as well as the downtown roadway traffic system. Section 5 in this technical memorandum provides additional discussion as to why moving transit off of the Mall was not carried forward as an alternative.
A new alternative, named the Partial Repair Alternative (described in Section 5), was added to the range of alternatives for study in the Level 2 evaluation.

All four build alternatives and the new Partial Repair Alternative were carried forward to the Level 2 evaluation to analyze costs, safety data, and other criteria.
<table>
<thead>
<tr>
<th>Category</th>
<th>Evaluation Criteria</th>
<th>No Build</th>
<th>Median and New Asymmetrical</th>
<th>Center Running</th>
<th>Center Running and New Asymmetrical</th>
<th>Rebuild in Existing Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure</td>
<td>Replacement of failing and outdated infrastructure.</td>
<td>No replacement of failing and outdated infrastructure. Does not meet Purpose and Need: does not replace failing and outdated infrastructure.</td>
<td>Full replacement of failing and outdated infrastructure (for example, pavement system, tree boxes, fountains) and potential addition of needed utilities (fiber, communications, electric). Potential ability to maintain infrastructure with reasonable remaining service life.</td>
<td>Full replacement of failing and outdated infrastructure (for example, pavement system, tree boxes, fountains) and potential addition of needed utilities (fiber, communications, electric). Potential ability to maintain infrastructure with reasonable remaining service life.</td>
<td>Full replacement of failing and outdated infrastructure (for example, pavement system, tree boxes, fountains) and potential addition of needed utilities (fiber, communications, electric). Potential ability to maintain infrastructure with reasonable remaining service life.</td>
<td></td>
</tr>
<tr>
<td>Effect of tree location on tree health</td>
<td>No change to tree location. Trees remain close to transit way and can be damaged by vehicles. Trees remain adequate distance from buildings and other trees.</td>
<td>On asymmetrical blocks, tree location is away from transit way (minimizing vehicle damage) and adequate distance from buildings and other trees. Tree location can be optimized to provide shade and use current best management practices for underground structure for health. On median blocks, trees remain close to transit way, resulting in potential damage by vehicles.</td>
<td>Tree location is away from transit way (minimizing vehicle damage) and adequate distance from buildings and other trees. Tree location can be optimized to provide shade and use current best management practices for underground structure for health.</td>
<td>Tree location is away from transit way (minimizing vehicle damage) and adequate distance from buildings and other trees. Tree location can be optimized to provide shade and use current best management practices for underground structure for health.</td>
<td>On asymmetrical blocks, tree location is away from transit way (minimizing vehicle damage) and adequate distance from buildings and other trees. On median blocks, trees remain close to transit way, resulting in potential damage by vehicles.</td>
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</tr>
<tr>
<td>Category</td>
<td>Evaluation Criteria</td>
<td>No Build</td>
<td>Median and New Asymmetrical</td>
<td>Center Running</td>
<td>Center Running and New Asymmetrical</td>
<td>Rebuild in Existing Configuration</td>
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</tr>
<tr>
<td>Safety</td>
<td>Separation/delineation of transit and pedestrians</td>
<td>Constrained pedestrian walking areas (less than 10 feet of clear pedestrian space) remain immediately adjacent to transit ways on median blocks and narrow sides of asymmetrical blocks. Does not meet Purpose and Need: does not address safety of pedestrians and transit.</td>
<td>Tree location separates pedestrian walking areas from transit ways on wider sides of asymmetrical blocks. Pedestrian walking areas on narrow sides of asymmetrical blocks remain immediately adjacent to transit ways, but are wider than in No Build and provide 10 feet of clear pedestrian space to accommodate pedestrian volumes. Constrained pedestrian walking areas (less than 10 feet of clear pedestrian space) remain immediately adjacent to transit ways on median blocks. Does not meet Purpose and Need: does not address safety of pedestrians and transit on median blocks.</td>
<td>Tree location separates pedestrian walking areas from transit ways on both sides of block. Pedestrian walking areas on narrow sides of asymmetrical blocks remain immediately adjacent to transit ways, but are wider than in No Build and provide 10 feet of clear pedestrian space to accommodate pedestrian volumes. Constrained pedestrian walking areas (less than 10 feet of clear pedestrian space) remain immediately adjacent to transit ways on both sides of median blocks and narrow sides of asymmetrical blocks. Does not meet Purpose and Need: does not address safety of pedestrians and transit.</td>
<td>Tree location separates pedestrian walking areas from transit ways on wider sides of asymmetrical blocks. Constrained pedestrian walking areas (less than 10 feet of clear pedestrian space) remain immediately adjacent to transit ways on both sides of median blocks and narrow sides of asymmetrical blocks. Does not meet Purpose and Need: does not address safety of pedestrians and transit.</td>
<td></td>
</tr>
<tr>
<td>Incorporation of RTD safety criteria, including incorporation of CPTED, lighting, and receptacle design.</td>
<td>Does not meet some RTD safety criteria, such as lighting and receptacle design.</td>
<td>Ability to meet RTD safety criteria.</td>
<td>Ability to meet RTD safety criteria.</td>
<td>Ability to meet RTD safety criteria.</td>
<td>Ability to meet RTD safety criteria.</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Evaluation Criteria</td>
<td>No Build</td>
<td>Median and New Asymmetrical</td>
<td>Center Running</td>
<td>Center Running and New Asymmetrical</td>
<td>Rebuild in Existing Configuration</td>
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</tr>
<tr>
<td>Mobility</td>
<td>Clear space for reliable two-way transit operations</td>
<td>Transit-lane width meets current design requirements.</td>
<td>Transit-lane width meets current design requirements.</td>
<td>Transit-lane width meets current design requirements.</td>
<td>Transit-lane width meets current design requirements.</td>
<td></td>
</tr>
<tr>
<td>Accommodation of pedestrian volumes</td>
<td>Pedestrian areas on outer edges of median blocks, and narrow sides of asymmetrical blocks, do not provide 10 feet of clear pedestrian space when 9 feet of patio space is provided. Does not meet Purpose and Need: does not accommodate pedestrian volumes and adequate gathering/patio space.</td>
<td>Pedestrian areas on outer edges of median blocks do not provide 10 feet of clear pedestrian space when 9 feet of patio space is provided. Both sides of block can provide 10 feet of clear pedestrian space with a variety of adjacent gathering opportunities. Both sides of asymmetrical blocks provide at least 10 feet of clear pedestrian space when 9 feet of patio space is provided, if narrow sides of blocks are a minimum 19 feet wide. Does not meet Purpose and Need: does not accommodate pedestrian volumes on median blocks.</td>
<td>Both sides of block can provide 10 feet of clear pedestrian space with a variety of adjacent gathering opportunities. Both sides of median block can provide 10 feet of clear pedestrian space with a variety of adjacent gathering opportunities. Both sides of asymmetrical blocks provide at least 10 feet of clear pedestrian space when 9 feet of patio space is provided, if narrow sides of blocks are a minimum 19 feet wide.</td>
<td>Pedestrian areas on outer sides of median blocks and narrow side of asymmetrical blocks do not provide 10 feet of clear pedestrian space when 9 feet of patio space is provided. Wide side of asymmetrical block can provide 10 feet of clear pedestrian space with a variety of adjacent gathering opportunities. Does not meet Purpose and Need: does not accommodate pedestrian volumes and adequate gathering/patio space.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ease of transit shuttle operations: number of shifts shuttles make from block to block</td>
<td>Two shifts over length of Mall</td>
<td>Two shifts over length of Mall</td>
<td>No shifts</td>
<td>Two shifts over length of Mall</td>
<td>Two shifts over length of Mall</td>
<td></td>
</tr>
<tr>
<td>Ability to adhere to ADA accessibility requirements</td>
<td>Mall does not fully adhere to ADA requirements. Median block promenades have physical obstructions to ADA accessibility.</td>
<td>Ability to adhere to ADA requirements.</td>
<td>Ability to adhere to ADA requirements.</td>
<td>Ability to adhere to ADA requirements.</td>
<td>Ability to adhere to ADA requirements.</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Evaluation Criteria</td>
<td>No Build</td>
<td>Median and New Asymmetrical</td>
<td>Center Running</td>
<td>Center Running and New Asymmetrical</td>
<td>Rebuild in Existing Configuration</td>
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<tr>
<td>Public Use</td>
<td>Space for both pedestrian use and gathering opportunities for leisure, commerce, and tourism</td>
<td>Outer sides of median blocks and narrow sides of asymmetrical blocks provide limited gathering space and configurations when pedestrian use is accommodated with 10 feet of clear pedestrian circulation. Medians are underutilized because transit ways physically separate median from pedestrian walking areas and because space constraints limit gathering opportunities along with pedestrian access between trees in the medians. Wide sides of asymmetrical blocks allow for a variety of configurations of gathering opportunities, including patios, and 10 feet of clear pedestrian circulation. Does not meet Purpose and Need: does not provide adequate gathering and patio space and accommodate pedestrian volumes.</td>
<td>Outer sides of median blocks and narrow sides of asymmetrical blocks provide limited gathering space and configurations when pedestrian use is accommodated with 10 feet of clear pedestrian circulation. Medians are underutilized because transit ways physically separate median from pedestrian walking areas and because space constraints limit gathering opportunities along with pedestrian access between trees in the medians. Narrow sides of asymmetrical blocks do not have room for trees.</td>
<td>Provides 28 feet of usable public space on both sides of blocks to allow for a variety of configurations of gathering opportunities, including patios, and 10 feet of clear pedestrian circulation. Offers opportunity for trees along both sides of blocks.</td>
<td>Center-running blocks provide 28 feet of usable public space on both sides of blocks to allow for a variety of configurations of gathering opportunities, including patios, along with 10 feet of clear pedestrian circulation. Narrow sides of asymmetrical blocks do not have room for trees. Wide sides of asymmetrical blocks allow for a variety of configurations of gathering opportunities, including patios, and 10 feet of clear pedestrian circulation.</td>
<td>Does not meet Purpose and Need: does not provide adequate gathering and patio space and accommodate pedestrian volumes.</td>
</tr>
<tr>
<td>Category</td>
<td>Evaluation Criteria</td>
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<td>Center Running and New Asymmetrical</td>
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</tr>
<tr>
<td>Public Use</td>
<td>Long-term adaptability: ability to allow for spatial reconfiguration for events or other changes, such as building use, over the next 40 years.</td>
<td>Asymmetrical blocks provide consolidated spaces to allow for future changes in space allocation.</td>
<td>Asymmetrical blocks provide consolidated spaces to allow for future changes in space allocation.</td>
<td>Ability to reconfigure restaurant patios away from buildings and maintain 10 feet of clear pedestrian space along both sides of all blocks. Ability to incorporate innovative technology and infrastructure to easily adapt to future changes in building use, Mall operations, bus technology and operations, and user expectations.</td>
<td>All blocks provide consolidated spaces to allow for future changes in space allocation. Ability to reconfigure restaurant patios away from buildings and maintain 10 feet of clear pedestrian space along both sides of all blocks. Ability to incorporate innovative technology and infrastructure to easily adapt to future changes in building use, Mall operations, bus technology and operations, and user expectations.</td>
<td>Asymmetrical blocks provide consolidated spaces to allow for future changes in space allocation. Ability to spatial reconfiguration is limited in median blocks as a result of space constraints for gathering opportunities along with pedestrian access between trees in the medians. Ability to reconfigure restaurant patios away from buildings and maintain 10 feet of clear pedestrian space along both sides of center-running blocks and one side on five asymmetrical blocks. Ability to incorporate innovative technology and infrastructure to easily adapt to future changes in building use, Mall operations, bus technology and operations, and user expectations.</td>
</tr>
<tr>
<td>Short-term flexibility for gathering opportunities and programming variety.</td>
<td>Requires removal of buses from Mall to reconfigure space on a larger scale on median blocks. No fiber, communications, or widespread electrical utilities.</td>
<td>Requires removal of buses from Mall to reconfigure space on a larger scale on median blocks. Consolidated spaces on asymmetrical blocks provide contiguous space for public use and activities, and changes in amenities and types of use. Opportunity to add utilities (fiber, communications, electric) to allow for changes in amenities and types of use.</td>
<td>Consolidates public gathering space from three areas to two, to provide more contiguous space for public use and activities, and changes in amenities and types of use. Opportunity to add utilities (fiber, communications, electric) to allow for changes in amenities and types of use.</td>
<td>Requires removal of buses from Mall to reconfigure space on a larger scale on median blocks. Consolidated spaces on asymmetrical blocks provide contiguous space for public use and activities, and changes in amenities and types of use. Opportunity to add utilities (fiber, communications, electric) to allow for changes in amenities and types of use.</td>
<td>Requires removal of buses from Mall to reconfigure space on a larger scale on median blocks. Consolidated spaces on asymmetrical blocks provide contiguous space for public use and activities, and changes in amenities and types of use. Opportunity to add utilities (fiber, communications, electric) to allow for changes in amenities and types of use.</td>
<td>Requires removal of buses from Mall to reconfigure space on a larger scale on median blocks. Consolidated spaces on asymmetrical blocks provide contiguous space for public use and activities, and changes in amenities and types of use. Opportunity to add utilities (fiber, communications, electric) to allow for changes in amenities and types of use.</td>
</tr>
<tr>
<td>Category</td>
<td>Evaluation Criteria</td>
<td>No Build</td>
<td>Median and New Asymmetrical</td>
<td>Center Running</td>
<td>Center Running and New Asymmetrical</td>
<td>Rebuild in Existing Configuration</td>
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<tr>
<td>Social and Environmental Impacts</td>
<td>Economic impacts: balance of opportunities and amenities along the Mall to benefit the public, residents, and adjacent property owners.</td>
<td>Asymmetrical blocks do not have similar opportunities for trees, gathering space, pedestrian circulation, or other amenities on both sides of the street.</td>
<td>Asymmetrical blocks do not have similar opportunities for trees, gathering space, pedestrian circulation, or other amenities on both sides of the street.</td>
<td>Provides the same opportunities for trees, gathering space, pedestrian circulation, and other amenities on both sides of the street.</td>
<td>Provides the same opportunities for trees, gathering space, pedestrian circulation, and other amenities on both sides of the street.</td>
<td>Asymmetrical blocks do not have similar opportunities for trees, gathering space, pedestrian circulation, or other amenities on both sides of the street. Underutilized medians attract activities like loitering, which can deter patrons from adjacent businesses.</td>
</tr>
<tr>
<td>Construction impacts: effects on businesses, residents, and transit operations.</td>
<td>Continued maintenance activities generate noise and limit transit mobility, and would continue to increase in frequency.</td>
<td>Construction activities generate noise and dust, and limit business access and pedestrian mobility.</td>
<td>Construction activities generate noise and dust, and limit business access and pedestrian mobility.</td>
<td>Construction activities generate noise and dust, and limit business access and pedestrian mobility.</td>
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<tr>
<td>Social and Environmental Impacts (cont’d)</td>
<td>Land use impacts: consistency with local plans and policies</td>
<td>Inconsistent with recommendations for infrastructure repair and upgrades.</td>
<td>Consistent with recommendations for transit service and infrastructure repair and upgrades.</td>
<td>Consistent with recommendations for transit service and infrastructure repair and upgrades.</td>
<td>Consistent with recommendations for transit service and infrastructure repair and upgrades.</td>
<td></td>
</tr>
<tr>
<td>Water quality</td>
<td>Does not meet current water quality treatment requirements.</td>
<td>Ability to incorporate water quality treatment features into design.</td>
<td>Ability to incorporate water quality treatment features into design.</td>
<td>Ability to incorporate water quality treatment features into design.</td>
<td>Ability to incorporate water quality treatment features into design.</td>
<td></td>
</tr>
<tr>
<td>Historic resource impacts: ability to honor original Mall design</td>
<td>Mall would retain its original design.</td>
<td>Ability to retain current locations of trees and lights on median blocks. Ability to retain current locations of trees and lights on wider sides of asymmetrical blocks. Small median with lights in between transit ways on asymmetrical blocks would be removed. Ability to accommodate existing paving pattern with some adjustments.</td>
<td>Trees and lights would be moved into rows on each side of transit way in a linear allée. Ability to maintain design element of double rows of alternating trees and lights. Ability to accommodate existing paving pattern with some adjustments.</td>
<td>On center-running blocks, trees and lights would be moved into rows on each side of transit way in a linear allée. Ability to maintain design element of double rows of alternating trees and lights. Ability to accommodate existing paving pattern with some adjustments.</td>
<td>Current locations of trees and lights would be retained. Ability to retain existing paving pattern.</td>
<td></td>
</tr>
<tr>
<td>Degree of public and agency support for the alternative</td>
<td>Public: Minimal support Agency: Not supported</td>
<td>Public: Minimal support Agency: Not strongly supported</td>
<td>Public: Strong support Agency: Strong support</td>
<td>Public: Moderate support Agency: Moderate support</td>
<td>Public: Moderate support Agency: Not supported</td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td>Capital cost</td>
<td>None</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Maintenance cost</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Construction duration</td>
<td>None</td>
<td>2 to 4 years</td>
<td>2 to 4 years</td>
<td>2 to 4 years</td>
<td>2 to 4 years</td>
</tr>
</tbody>
</table>

Notes:
1. Applicable CPTED strategies recommended by RTD include: maximizing visibility of people and patron flow areas; providing adequate lighting minimizing shadows; landscape plantings that maximize visibility; elimination of structural hiding places; open lines of sight; and painting with light (RTD, 2016)
2. One foot of sidewalk width can comfortably carry four pedestrians/minute and 240 pedestrians/hour (Gehl, 2010). Existing 8-foot walks are too narrow for peak period pedestrian volumes and do not adhere to CCD standards for 10-foot sidewalk widths downtown (CCD, 1993).
B. Level 2 Evaluation

1. Alternatives and Options Evaluated

a) Alignment Alternatives

Five build alternatives and the No Build Alternative were analyzed in the Level 2 evaluation, along with options for pavement materials and curbs. The Level 2 evaluation assessed the No Build and build alternatives against the following criteria:

- Cost and infrastructure
- Safety and security
- Transit and pedestrian mobility
- Public Use functionality
- Community and social/environment impacts

Table 6-2 details the performance of each build alternative and the No Build Alternative against the Level 2 evaluation criteria.

b) Pavement Materials Options

Pavement materials were evaluated using similar criteria to those used for the Level 2 evaluation. The pavement materials evaluated included the following:

- Granite pavers with a mortar setting bed for the full Mall width
  - Pavers would be set on a drainable bedding on top of a concrete slab
  - If technically feasible, size could be matched to existing granite paver size
  - Existing pattern and color could be approximately replicated

- Unit pavers (granite, clay, or concrete) in a sand setting bed for the full Mall width
  - Pavers would be set on a drainable bedding on top of a concrete slab
  - Size would likely be 4 inches by 8 inches
  - Existing pattern and color could be approximately replicated

- Precast concrete slabs in the transit way with granite pavers in the sidewalks
  - Existing pattern in the transit way could be approximately replicated with scoring in the concrete
  - Existing colors in the transit way could be approximately replicated through integral color in the concrete

- Cast-in-place concrete option A in the transit way with granite pavers in the sidewalks
  - Standard cast-in-place concrete in the transit way, which would require approximately two replacements over a 40-year lifespan
  - Replicating the existing pattern in the transit way would be highly difficult to achieve
  - Replicating the existing color in the transit way would not be feasible

- Cast-in-place concrete option B in the transit way and granite pavers in the sidewalks
  - Concrete would be designed for a 40-year lifespan with three 5-inch mill and overlays (this type of concrete construction minimizes the cracking, chipping, spalling, and polishing common with standard concrete)
Replicating the existing pattern would be highly difficult to achieve
- Replicating the existing color would not be feasible

Table 6-3 details the pavement materials evaluation.

c) Curb Options

Three transit way curb options were considered for the alternatives: a vertical curb that mimics the existing curbs that are on the outer edges of the existing transit lanes, a pan that mimics the existing pan on the inner edges of the existing transit lanes, or a hybrid design with vertical curbs at shuttle stops and cross streets and a pan in other locations (Figure 6-1). The vertical curb, illustrated conceptually on Figure 6-2, would be 4 to 6 inches tall. The pan, illustrated conceptually on Figure 6-3, would slope from the edges to the flowline in the center; the flowline would appear as a shallow longitudinal channel within the pan to direct water as part of the drainage system. In the hybrid option, the vertical curb would be constructed at shuttle stops and cross streets and a pan would be constructed along the transit way in other locations, unless drainage design or ADA compliance requires additional curbs.

Table 6-4 details the curb options evaluation, and Section 7.1 describes the design features associated with each curb option in more detail relative to safety, accessibility, and effects to the historic pavement pattern.
2. Initial Conclusions

a) Alignment Alternatives

The Level 2 evaluation concluded that the Median and New Asymmetrical Alternative, the Rebuild in Existing Configuration Alternative, and the Partial Repair Alternative would not meet the Project needs for mobility, safety, and public use; the Partial Repair Alternative additionally would not meet the Project need for infrastructure.

The Level 2 evaluation concluded that of the remaining alternatives that met the Project needs, the Center Running Alternative met the Project needs and goals better than the Center-running and New Asymmetrical Alternative:

- The Center Running Alternative would provide a safer condition because trees would be placed between pedestrian walking areas and transit ways on both sides of the block, better delineating pedestrian and transit areas, consistent with RTD standards (RTD, 2016a) and guidance (NACTO, 2013; NACTO, 2016; FHWA, 2017). In contrast, the narrow side of the asymmetrical blocks in the Center-running and New Asymmetrical Alternative would have the pedestrian walking area immediately adjacent to the transit way, with no tree/amenity zone or other buffer between them.

- The Center Running Alternative would provide better opportunities for public use because trees would be present on both sides of the block, providing shade and zones for public gathering and shuttle stops; in contrast, the narrow side of the asymmetrical blocks in the Center-running and New Asymmetrical Alternative would not have trees or space for shuttle stops that do not obstruct the pedestrian walking area.

- The Center Running Alternative would provide equitable distribution of pedestrian space and public amenities, providing benefits for public use and economic vitality for businesses on both sides of the Mall. The Center-running/New Asymmetrical Alternative would perpetuate inequitable distribution of amenity space and sidewalk capacity fronting businesses, resulting in more public use and a larger customer base adjacent to businesses on wide sides.

The Center Running and New Asymmetrical Alternative would have less impact on the historic design of the Mall than the Center Running Alternative by maintaining an asymmetrical design on the five and a half blocks at the ends of the original Mall and maintaining the existing progression and locations of a beginning, middle, and end of the Mall. The design of the asymmetrical blocks in the Center-running and New Asymmetrical Alternative was refined to better meet the Project’s needs and goals, minimize impacts to the Mall’s historic design, and respond to stakeholder input; Section 6.B.3 explains these refinements.

b) Pavement Materials Options

The pavement materials options analysis concluded that although the granite pavers in a mortar bed for the width of the Mall option is more expensive than the other options, and would take longer to construct than the concrete pavement options, granite would most honor the historic design of the Mall and was the most-supported pavement system by CCD, owner of the street. Additionally, each pavement option has various surface treatments to provide appropriate friction for vehicles and pedestrians, which can increase safety. The concrete
options need to be replaced or receive concrete overlays throughout the life of the facility, creating impacts at a later date.

c) **Curb Options**
The Level 2 evaluation of curb options concluded that the hybrid curb option best met the selection criteria and was supported by CCD and RTD.

3. **Identification of the LPA**
The Center-running and New Asymmetrical Alternative was refined to better address the Project purpose, needs, and goals, minimize impacts to the Mall’s historic design, and respond to stakeholder input. Refinements to the asymmetrical block design comprise shifting the transit way and the pavement pattern on the wide side of the block, including the locations of trees and lights, two feet closer to the buildings (north) to allow for an amenity zone with a third row of trees between pedestrians and transit on the narrow side of the block. These refinements improved the alternative by:

- Providing safer conditions by creating an amenity zone with a row of trees that would physically separate the pedestrian walkway and transit way and provide space for shuttle stops within the amenity zone, so people waiting for the bus do not obstruct the pedestrian walkway.

- Minimizing impacts to the historic design by aligning one row of trees between the asymmetrical and center-running blocks so there is a straight line of trees down the Mall, which is an element of the existing design, and maintaining the existing progression and location of a beginning, middle, and end of the Mall by retaining the design concept of five and a half asymmetrical blocks at the beginning and end of the Mall and seven symmetrical blocks in the middle of the Mall.

- Providing trees and public amenity space on both sides of the asymmetrical blocks, more equitably distributing space and providing more equal benefits to public use and business vitality.

After continued analysis (including continued review of guidance, a Project-specific safety analysis, and continued refinement of edge delineation concepts design to meet the Project purpose and need), the project team determined that the refinements to the New Asymmetrical cross-section design are needed for the Center-running and New Asymmetrical Alternative to meet the Project purpose and need.

Current national guidance and RTD standards recommend visually and physically separating walkways from transit lanes to minimize instances of pedestrians inadvertently walking into transit lanes. Federal Highway Administration’s (FHWA) 2013 Pedestrian Safety Guide recommends a buffer zone between 4 and 6 feet wide to separate pedestrians from the street, noting that street furniture or an amenity zone is typically appropriate in downtown or commercial areas (FHWA, 2013). The National Association of City Transportation Officials (NACTO) recommends an amenity zone with street furniture (such as benches, greenery, bollards, street lights, and bicycle parking) be used to delineate between the two areas (NACTO, 2013 and 2016). *RTD Bus Infrastructure Design Guidelines and Criteria* require that pedestrian/transit conflicts be eliminated, or at the least minimized, by separating pedestrian pathways from active bus lanes (RTD, 2016a).
The added space for an amenity zone on the narrow side of the asymmetrical block in the Center Running and New Asymmetrical Alternative allows for a physical and visual delineation between the transit way and the pedestrian walkway, in compliance with RTD standards and national guidance. Further, mobility and public use are part of the purpose and need for the project. The proposed dimensions for the pedestrian walkway and patio/gathering area are needed to meet those factors of the purpose and need.

The refined Center Running and New Asymmetrical Alternative, with granite pavers set in a mortar bed and a hybrid curb design of vertical curbs at designated shuttle stops and cross streets and a pan in other locations, was selected as the LPA because of its ability to meet the Project purpose and need, as well as minimization of impacts to the historic resource.

4. Design Options to the LPA

As part of consultation under Section 106 of the National Historic Preservation Act, Historic Denver requested CCD and RTD explore modifications to the LPA’s New Asymmetrical block design on a subset of the original asymmetrical blocks. On asymmetrical blocks, the LPA would shift the pavement pattern, including the locations of trees and lights, two feet closer to the buildings (north) to provide space for an amenity zone on the narrow side of the block. The amenity zone is necessary to provide safe physical and visual delineation between the transit way and the pedestrian walkway.

Historic Denver requested modifications focused on rebuilding in place the pedestrian area on the wide (north) side of the block, from the building faces to the outer (north) edge of the existing transit way, on 3 ½ of the original 5 ½ asymmetrical blocks, from Market Street to Lawrence Street and from Court Place to Broadway. This would eliminate the 2-foot “shift” in the pavement pattern and rows of lights and trees on the wide side of the block, and would reduce space for public use on the narrow side of the block by 2 feet. Historic Denver proposed modifications to these 3 ½ blocks because they felt existing building uses and plazas on adjacent properties create a different context on these blocks.

To maintain the concept of three “rooms” on the Mall, Historic Denver proposed extending the Center Running block design one block farther on each end, into two of the existing asymmetrical blocks, rather than having additional transitions and multiple asymmetrical block designs.

a) Design Options Evaluated

CCD and RTD developed two design options to respond to Historic Denver’s request. Both design options would retain the existing pavement pattern location, including locations of trees and lights, on the wide side of the applicable asymmetrical blocks (rather than shift the pattern over 2 feet as proposed in the LPA), and would add 5 feet to the narrow side of the block (rather than add 7 feet as proposed in the LPA). The 2-foot difference would need to be removed from one of the three uses on the narrow side of the block: patio/gathering space, pedestrian walkway, or amenity zone. The pedestrian walkway cannot be smaller than 10 feet, thus the 2-foot width would be removed from the patio/gathering space or amenity zone. The resulting design options vary in where the 2-foot difference on the narrow side of the block would occur. Under both design options, the Center Running blocks would be extended one block farther in each direction, illustrated in Figure 6-4.
In comparison to the LPA, Design Option 1 would reduce the amenity zone by 2 feet, and the patio width would remain 9 feet as it is today, illustrated in Figure 6-5. The 3-foot amenity zone would not be wide enough to accommodate a row of trees and lights or other street furnishings. In order to safely separate and delineate the pedestrian walkway and the transit way, it would be necessary to add a row of vertical bollards in the amenity zone. A secondary light source would also need to be added to provide adequate nighttime lighting.

In comparison to the LPA, Design Option 2 would reduce the patio width by 2 feet. The 7-foot-wide patio space would reduce seating capacity by one-third from the existing (and proposed LPA) 9-foot width. The 5-foot amenity zone would be wide enough to accommodate a row of trees and lights and other street furnishings, similar to the LPA. Unlike the LPA, the row of trees would not be able to align with the row of trees in the center running blocks.

Both design options would reconstruct the half-block (the triangle plaza block from Cleveland Place to Broadway) with pavers in the same pattern and location as the original design; other elements of the triangle block, including the lights, trees, and fountain, would also be reconstructed in same location.

Table 6-5 details the design options evaluation.

Figure 6-4. Block Design Location – Existing, LPA, and LPA Design Options
Figure 6-5. Cross Section Design – Existing, LPA, and LPA Design Options

Existing Asymmetrical

LPA Asymmetrical

Asymmetrical Design Option 1

Asymmetrical Design Option 2
b) Conclusions

The Level 2 analysis of the design options concluded:

- Design Option 1 is eliminated from further consideration
- Design Option 2 is carried forward for further study in the EA
- Reconstruction of the triangle plaza block between Cleveland Place and Broadway in the same pattern and location as the original design is incorporated into the LPA design

Both design options 1 and 2 would accomplish Historic Denver’s goals of rebuilding in place the pedestrian area on the wide (north) side of the block. The 3-foot amenity zone in Design Option 1 does not provide space for trees, lights, or street furnishings on the narrow side of the block and requires introducing vertical bollards, which are undesirable new visual elements, to safely separate pedestrians and transit. Design Option 2 would not meet the public use needs of the Project as well as the LPA, but it would better meet the purpose and need and have fewer impacts than Design Option 1. The unique conditions of the half-block triangle plaza between Cleveland Place and Broadway provide the opportunity to incorporate into the LPA reconstruction of this half-block in its original design.
Table 6-2. Level 2 Alternatives Evaluation

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>No Build</th>
<th>Alternative Median and New Asymmetrical</th>
<th>Alternative Center Running</th>
<th>Alternative Center Running and New Asymmetrical</th>
<th>Rebuild in Existing Configuration</th>
<th>Partial Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics and Cost</td>
<td>Failing pavement system in constant need of repair</td>
<td>Capital cost</td>
<td>N/A</td>
<td>$76M to $137M depending on pavement material</td>
<td>$76M to $137M depending on pavement material</td>
<td>$76M to $137M depending on pavement material</td>
<td>$76M to $137M depending on pavement material</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Annual transit way and sidewalk maintenance cost</td>
<td>$1.2M</td>
<td>$85,000 to $310,000, depending on pavement material</td>
<td>$85,000 to $310,000, depending on pavement material</td>
<td>$85,000 to $310,000, depending on pavement material</td>
<td>$85,000 to $310,000, depending on pavement material</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Future transit way replacement cost</td>
<td>N/A</td>
<td>$0 to $20M, depending on pavement material</td>
<td>$0 to $20M, depending on pavement material</td>
<td>$0 to $20M, depending on pavement material</td>
<td>$0 to $20M, depending on pavement material</td>
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<td></td>
<td>40-year investment</td>
<td></td>
<td></td>
<td>$46.6M</td>
<td>$85M to $152M</td>
<td>$85M to $152M</td>
<td>$85M to $152M</td>
</tr>
<tr>
<td>Outdated infrastructure does not meet current ADA requirements and leads to poor tree health; lack of water quality treatment and modern fiber optic and communications utilities doesn’t meet modern-day needs</td>
<td>Ability to address ADA deficiencies</td>
<td>Not possible to address all ADA deficiencies</td>
<td>Not a discriminator: Can address all ADA deficiencies</td>
<td>Not a discriminator: Can address all ADA deficiencies</td>
<td>Not a discriminator: Can address all ADA deficiencies</td>
<td>Not a discriminator: Can address all ADA deficiencies</td>
<td>Not a discriminator: Can address all ADA deficiencies</td>
</tr>
<tr>
<td></td>
<td>Tree infrastructure is updated to modern standards</td>
<td>Ranks poorly for tree health: No replacement of obsolete tree infrastructure (tree boxes and irrigation)</td>
<td>Ranks well for tree health: Installs modern tree planting infrastructure and new trees; conflicting utilities would be relocated.</td>
<td>Ranks well for tree health: Installs modern tree infrastructure and new trees; conflicting utilities would be relocated.</td>
<td>Ranks well for tree health: Installs modern tree infrastructure and new trees; conflicting utilities would be relocated.</td>
<td>Ranks well for tree health: Installs modern tree infrastructure and new trees; conflicting utilities would be relocated.</td>
<td>Ranks slightly better than No Build Alternative: Replacement of missing and dead trees. No replacement of obsolete tree infrastructure (tree boxes and irrigation).</td>
</tr>
<tr>
<td></td>
<td>Water quality treatment is added to stormwater drainage system</td>
<td>No water quality improvements: No change in treatment of stormwater runoff beyond maintenance activities and normal Mall janitorial activities.</td>
<td>Improves water quality: Installs stormwater quality treatment facilities, meeting City standards.</td>
<td>Improves water quality: Installs stormwater quality treatment facilities, meeting City standards.</td>
<td>Improves water quality: Installs stormwater quality treatment facilities, meeting City standards.</td>
<td>Improves water quality: Installs stormwater quality treatment facilities, meeting City standards.</td>
<td>No water quality improvements: No change in treatment of stormwater runoff beyond maintenance activities and normal Mall janitorial activities.</td>
</tr>
<tr>
<td>Category</td>
<td>Criteria</td>
<td>No Build</td>
<td>Alternative Median and New Asymmetrical</td>
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<td>Alternative Center Running and New Asymmetrical</td>
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<tr>
<td>Safety and Security</td>
<td>Poor delineation between undersized pedestrian walks and transit causes near misses between pedestrians and transit vehicles</td>
<td>Pedestrian overflow into transit ways</td>
<td>No change: Median blocks: 8-foot outer pedestrian walks remain undersized, resulting in pedestrian overflow into transit ways. Asymmetrical blocks: 8-foot outer pedestrian walks on narrow side of block remain undersized, resulting in pedestrian overflow into transit ways. 14-foot walkways on wide side of block accommodate pedestrians without overflow into transit ways.</td>
<td>Ranks third: Median blocks: 8-foot outer pedestrian walks remain undersized, resulting in pedestrian overflow into transit ways. 14-foot walkways on wide side of block accommodate pedestrians without overflow into transit ways.</td>
<td>Ranks best: Center-running blocks: 10-foot minimum pedestrian walks accommodate pedestrians without overflow into transit ways.</td>
<td>Ranks second best: Center-running blocks: 10-foot minimum pedestrian walks accommodate pedestrians without overflow into transit ways. New Asymmetrical blocks: 10-foot walkways on asymmetrical blocks accommodate pedestrians without overflow into transit ways.</td>
<td>Same as No Build</td>
</tr>
<tr>
<td>Delineation between pedestrians and transit</td>
<td>No change: Median blocks: Pedestrian walks remain directly adjacent to transit way and do not meet RTD standards and guidance for physical separation and delineation of pedestrian and vehicular areas. Asymmetrical blocks: Pedestrian walks separated by tree/amenity zones as recommended by guidance on wide side of block. Ability to shift pedestrian walk to storefront on wide side of block to further separate pedestrians from transit.</td>
<td></td>
<td>Ranks third: Median blocks: Pedestrian walks remain directly adjacent to transit way and do not meet RTD standards and guidance for physical separation and delineation of pedestrian and vehicular areas. New Asymmetrical blocks: Pedestrian walks separated by tree/amenity zones as recommended by guidance on wide side of block. Ability to shift pedestrian walk to storefront on wide side of block to further separate pedestrians from transit.</td>
<td>Ranks best: Center-running blocks: Pedestrian walks separated by tree/amenity zones as recommended by guidance. Ability to shift pedestrian walks to storefronts and further separate pedestrians from transit. Additional options for delineation between pedestrian and transit areas: Same options for delineation between pedestrian and transit areas as Median and New Asymmetrical Alternative.</td>
<td>Ranks second best: Center-running blocks: Pedestrian walks separated by tree/amenity zones as recommended by guidance. Ability to shift pedestrian walks to storefronts and further separate pedestrians from transit. New Asymmetrical blocks: Same as Median and New Asymmetrical alternative. Options for delineation between pedestrian and transit areas: Same options for delineation between pedestrian and transit areas as Median and New Asymmetrical Alternative.</td>
<td>Same as No Build</td>
<td>Same as No Build</td>
</tr>
<tr>
<td>Category</td>
<td>Criteria</td>
<td>No Build</td>
<td>Alternative Median and New Asymmetrical</td>
<td>Alternative Center Running</td>
<td>Alternative Center Running and New Asymmetrical</td>
<td>Rebuild in Existing Configuration</td>
<td>Partial Repair</td>
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</tr>
<tr>
<td>Poor delineation between undersized pedestrian walks and transit causes near misses between pedestrians and transit vehicles (continued)</td>
<td>Delineation between pedestrians and transit</td>
<td>Pedestrian walks on narrow side of block remain directly adjacent to transit ways and do not meet RTD standards and guidance for physical separation and delineation of pedestrian and vehicular areas. 4-inch curb of same appearance and material as pedestrian and transit surface is the only delineation between pedestrian and transit areas.</td>
<td>Pedestrian walks on narrow side of block remain directly adjacent to transit way and do not meet RTD standards and guidance for physical separation and delineation of pedestrian and vehicular areas. Additional options for delineation between pedestrian and transit areas: Retain existing 4-inch curb; install higher curb between walks and transit; barrier or bollards between walks and transit; shift pedestrian walks adjacent to storefronts; provide visual and/or tactile difference in materials between walks and transit; use technology to delineate walks and transit, such as colored lights.</td>
<td></td>
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</tr>
<tr>
<td>Higher crash numbers adjacent to median blocks (Arapahoe Street to Tremont Place)</td>
<td>Ability to address higher crash locations from Arapahoe Street to Tremont Place</td>
<td>No change: Same street cross section and conflict/crossing points – median and asymmetrical geometrics remain. Same number of conflict points remain at each intersection and block, and same cross-street width remains in place.</td>
<td>Moderate improvement to higher crash locations: Intersection bulb-outs reduce cross-street width at intersections, providing moderate safety benefit from reduced crossing distance and improved visibility/conspicuity for pedestrians. Same number of conflict points remain at each intersection and block.</td>
<td>Greatest improvement to higher crash locations: Intersection bulb-outs reduce cross-street width at intersections, providing moderate safety benefit from reduced crossing distance and improved visibility/conspicuity for pedestrians. Number of conflict points reduced at intersections and within blocks, in former median blocks.</td>
<td>Greatest improvement to higher crash locations: Intersection bulb-outs reduce cross-street width at intersections, providing moderate safety benefit from reduced crossing distance and improved visibility/conspicuity for pedestrians. Number of conflict points reduced at intersections and within blocks, in former median blocks.</td>
<td>Moderate improvement to higher crash locations: Intersection bulb-outs reduce cross-street width at intersections, providing moderate safety benefit from reduced crossing distance and improved visibility/conspicuity for pedestrians. Same number of conflict points remain at each intersection and block.</td>
<td></td>
</tr>
</tbody>
</table>
### 16th Street Mall Alternatives Analysis and Environmental Clearance: Alternatives Analysis Report

**Use Increases on the Mall**

- Passengers and pedestrian transit operations would become increasingly disruptive as frequency continues to increase, under any pavement design option.
- System standards should be maintained.
- Safety and security systems should be upgraded to current standards.

**Effect on transit operations**

- Effect on transit operations would become increasingly difficult as the volume of passengers and pedestrian use increases on the Mall.
- Agreeable, but less preferred, by RTD: Bus operators need to protect both the curb and median sides of the bus.

### Pavement Design Options

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>No Build</th>
<th>Alternative Median and New Asymmetrical</th>
<th>Alternative Center Running</th>
<th>Alternative Center Running and New Asymmetrical</th>
<th>Rebuild in Existing Configuration</th>
<th>Partial Repair</th>
</tr>
</thead>
</table>
| Slick pavement surface causes pedestrian slips and falls, bus traction problems, compounded by snowy or icy conditions in winter | Pavement surface reduces “slip, trip and fall” risks | No change: Slick granite surface would remain the same assuming no further modifications. | Not a discriminator: Pavement design options comprise granite pavers with a higher friction finish, unit pavers, precast concrete, and cast-in-place concrete. | Not a discriminator: Pavement design options comprise granite pavers with a higher friction finish, unit pavers, precast concrete, and cast-in-place concrete. | Not a discriminator: Pavement design options comprise granite pavers with a higher friction finish, unit pavers, precast concrete, and cast-in-place concrete. | Not a discriminator: Pavement design options comprise granite pavers with a higher friction finish, unit pavers, precast concrete, and cast-in-place concrete. | Ranks below other action alternatives: Granite pavers in transit ways would be cleaned and refinished to improve surface friction.
| Safety and security systems should be upgraded to current standards. | Ability to accommodate future technology for security best practices | No improvements: No fiber optic utilities or updated electric power supply to meet future security technology needs. | Not a discriminator: Installs new fiber optic and upgraded electric utilities. | Not a discriminator: Installs new fiber optic and upgraded electric utilities. | Not a discriminator: Installs new fiber optic and upgraded electric utilities. | Not a discriminator: Installs new fiber optic and upgraded electric utilities. | Not a discriminator: Installs new fiber optic and upgraded electric utilities. |

### Transit Mobility and Operations

| Frequent maintenance disrupts transit operations, and would be more disruptive as ridership increases | Provision of connectivity between DUS and CCS, and crossing bus and light rail routes in between | No change: Maintains existing connection. Service expansion options comprise operating buses in tandem or procuring larger buses. | Same as No Build | Same as No Build | Same as No Build | Same as No Build | Same as No Build |
| Accommodation of tandem and/or larger buses at shuttle stops | Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (trees, lights) prevent bus boarding along length of block. | Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (trees, lights) prevent bus boarding along length of block. | Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (trees, lights) prevent bus boarding along length of block. | Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (trees, lights) prevent bus boarding along length of block. | Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (trees, lights) prevent bus boarding along length of block. | Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (trees, lights) prevent bus boarding along length of block. | Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (trees, lights) prevent bus boarding along length of block. |

### Pavement Design Options

- Slick pavement surface reduces asymmetrical blocks.
- Slick surface, high maintenance frequency, and maneuvering between median and asymmetrical blocks.
- Agreeable, but less preferred, by RTD: Bus operators need to protect both the curb and median sides of the bus.
- Agreeable, but less preferred, by RTD: Bus operators need to protect both the curb and median sides of the bus. 
- Agreeable, but less preferred, by RTD: Bus operators need to protect both the curb and median sides of the bus.
<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>No Build</th>
<th>Alternative Median and New Asymmetrical</th>
<th>Alternative Center Running</th>
<th>Alternative Center Running and New Asymmetrical</th>
<th>Rebuild in Existing Configuration</th>
<th>Partial Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>During construction the efficiency of transit operations would be dramatically reduced</td>
<td>Minimum disruption during construction</td>
<td>Lowest impact: Limited to maintenance activities which vary by year.</td>
<td>Comparable to other action alternatives except Partial Repair: Major impact during the construction period; length of construction period varies depending on pavement design.</td>
<td>Comparable to other action alternatives except Partial Repair: Major impact during the construction period; length of construction period varies depending on pavement design.</td>
<td>Comparable to other action alternatives except Partial Repair: Major impact during the construction period; length of construction period varies depending on pavement design.</td>
<td>Comparable to other action alternatives except Partial Repair: Major impact during the construction period; length of construction period varies depending on pavement design.</td>
<td>Less impact than the other action alternatives: Construction would occur primarily in the transit ways and would have less disruption in the pedestrian areas than the other action alternatives.</td>
</tr>
</tbody>
</table>

**Pedestrian mobility**

Sidewalks are undersized for pedestrian volumes and CCD standards (10-foot sidewalks downtown). Pedestrian volumes and accessibility guidelines are accommodated

No change:
- Median blocks: Pedestrian volumes and CCD standards not accommodated - 1,920 pedestrians/hour on 8-foot sidewalks next to patio/gathering space. Asymmetrical blocks: Pedestrian volumes and CCD standards not accommodated on narrow side of block - 1,920 pedestrians/hour on 8-foot sidewalks next to patio/gathering space. Pedestrian volumes and accessibility guidelines are accommodated on wide side of block - 3,360 pedestrians/hour on 14-foot sidewalks, with additional space for pedestrians and/or amenities.

Mineral change from No Build:
- Median blocks: No change from No Build. New Asymmetrical blocks: Pedestrian volumes and CCD standards are accommodated - 2,400 pedestrians/hour on 10-foot sidewalks next to patio/gathering space, with additional space for pedestrians and/or amenities.

Center-running blocks:
- Pedestrian volumes and CCD standards are accommodated - 2,400 pedestrians/hour on 10-foot sidewalks next to patio/gathering space, with additional space for pedestrians, shuttle stops, and/or amenities. New Asymmetrical blocks: Pedestrian volumes and CCD standards are accommodated - 2,400 pedestrians/hour on 10-foot sidewalks next to patio/gathering space, with additional space for pedestrians, shuttle stops, and/or amenities.

Same as No Build

Same as No Build
<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>No Build</th>
<th>Alternative Median and New Asymmetrical</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Public Use Functionality</td>
<td>Limited usability of divided public space on median blocks and narrow sides of asymmetrical blocks to accommodate patio/gathering space and pedestrian needs.</td>
<td>Width for patio and gathering space</td>
<td>Ranks third: Median Blocks: Walkways in outer pedestrian areas of median blocks are not wide enough to accommodate 9-foot patio/gathering space and 10-foot pedestrian sidewalk. Medians are not conducive to stationary gathering activities because they are too narrow, lack edges, and are surrounded by transit shuttles. Asymmetrical Blocks: Walkways on narrow sides of asymmetrical blocks are not wide enough to accommodate 9-foot patio/gathering space and 10-foot pedestrian walk.</td>
<td>Ranks best: Center-running Blocks: Walkways on both sides of blocks are wide enough for 9-foot patio/gathering space and 10-foot pedestrian sidewalk, with additional space for amenities and/or pedestrians.</td>
<td>Ranks second best: Center-running Blocks: Walkways on both sides of blocks are wide enough for 9-foot patio/gathering space and 10-foot pedestrian walk, with additional space for amenities and/or pedestrians. New Asymmetrical Blocks: Walkways on both sides of asymmetrical blocks are wide enough to accommodate 9-foot patio/gathering space and 10-foot pedestrian walk, with additional space for amenities and/or pedestrians.</td>
<td>Same as No Build</td>
<td>Same as No Build</td>
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<tr>
<td></td>
<td>Adherence to best practices for natural surveillance, activation, and positive public use of pedestrian and gathering areas.</td>
<td>No change: Median blocks have low public use and natural surveillance, increased negative behaviors (for example, panhandling), and decreased sense of safety because of size, physical separation from primary walkways, and frequent shuttle service on each side. Asymmetrical blocks can accommodate best practices for natural surveillance and accommodate positive public use and activities.</td>
<td>Same as No Build</td>
<td>Improved over No Build: Replaces public space in medians with consolidated public space adjacent to buildings, increasing natural surveillance and adhering to safety and security best practices.</td>
<td>Improved over No Build: Replaces public space in medians with consolidated public space adjacent to buildings, increasing natural surveillance and adhering to safety and security best practices. New Asymmetrical blocks can accommodate best practices for natural surveillance and accommodate positive public use and activities.</td>
<td>Same as No Build</td>
<td>Same as No Build</td>
</tr>
<tr>
<td>Category</td>
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<td>No Build</td>
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</tr>
<tr>
<td>Community and Environment</td>
<td>Construction impacts</td>
<td>Lowest impact: Limited to maintenance activities which vary by year.</td>
<td>Comparable to other action alternatives except Partial Repair: Major impact during the construction period; length of construction period varies depending on pavement design.</td>
<td>Comparable to other action alternatives except Partial Repair: Major impact during the construction period; length of construction period varies depending on pavement design.</td>
<td>Comparable to other action alternatives except Partial Repair: Major impact during the construction period; length of construction period varies depending on pavement design.</td>
<td>Less impact than other action alternatives: Construction would occur primarily in the transit ways and would have less disruption in the pedestrian areas than the other action alternatives.</td>
<td></td>
</tr>
<tr>
<td>Environmental impacts</td>
<td>Historic resources impacts</td>
<td>Minimal change from existing conditions: The rate at which the Mall deteriorates from use would increase as ridership and pedestrian use increase. Ad hoc replacement of pavers would continue.</td>
<td>Impacts historic properties. More change than Rebuild in Existing Configuration and Partial Repair alternatives: Median blocks maintain historic design. New Asymmetrical blocks modify historic design; can accommodate existing pavement pattern and spatial relationships, with some adjustments.</td>
<td>Impacts historic properties. More change than Rebuild in Existing Configuration and Partial Repair alternatives: Center-running design replaces both median and asymmetrical blocks. Ability to accommodate existing pavement pattern, with minor adjustments.</td>
<td>Impacts historic properties. More change than Rebuild in Existing Configuration and Partial Repair alternatives: Center-running design replaces median blocks. Ability to accommodate existing pavement pattern, with minor adjustments. New Asymmetrical blocks modify historic design; can accommodate existing pavement pattern and spatial relationships, with some adjustments.</td>
<td>Impacts historic properties. Less change than all but the Partial Repair alternative: No change in spatial configuration or pavement pattern, but more change than Partial Repair alternative as a result of reconstruction of entire Mall.</td>
<td>Impacts historic properties. Least change from existing conditions: No change in spatial configuration or pavement pattern.</td>
</tr>
<tr>
<td>Category</td>
<td>Criteria</td>
<td>No Build</td>
<td>Alternative Median and New Asymmetrical</td>
<td>Alternative Center Running</td>
<td>Alternative Center Running and New Asymmetrical</td>
<td>Rebuild in Existing Configuration</td>
<td>Partial Repair</td>
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</tr>
<tr>
<td>Environmental impacts (continued)</td>
<td>Socioeconomic impacts</td>
<td>Minimal changes from existing conditions.</td>
<td>Potential benefits to social, economic, and land use resources because of higher public use and perception of safety. Center-running blocks provide equitable distribution of pedestrian space and public amenities, including tree canopy and gathering space, providing benefits for economic vitality of businesses on both sides of the Mall.</td>
<td>Potential benefits to social, economic, and land use resources because of higher public use and perception of safety. Center-running blocks provide equitable distribution of pedestrian space and public amenities, including tree canopy and gathering space, providing benefits for economic vitality of businesses on both sides of the Mall.</td>
<td>Minimal changes to social, economic, and land use resources. Asymmetrical blocks perpetuate inequitable distribution of amenity space and sidewalk capacity fronting businesses. Wide sides of block allow more space for walking and gathering than narrow sides, resulting in larger customer base adjacent to businesses on wide sides.</td>
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<tr>
<td>Natural resources impacts</td>
<td>Minimal changes from existing conditions.</td>
<td>Not a discriminator: Replaces 400,000 square feet of hardscape, installs water quality treatment (benefit to water quality). No changes to other resources.</td>
<td>Not a discriminator: Replaces 400,000 square feet of hardscape, installs water quality treatment (benefit to water quality). No changes to other resources.</td>
<td>Not a discriminator: Replaces 400,000 square feet of hardscape, installs water quality treatment (benefit to water quality). No changes to other resources.</td>
<td>Not a discriminator: Replaces 400,000 square feet of hardscape, installs water quality treatment (benefit to water quality). No changes to other resources.</td>
<td>Not a discriminator: Replaces 400,000 square feet of hardscape, installs water quality treatment (benefit to water quality). No changes to other resources.</td>
<td></td>
</tr>
<tr>
<td>Public and agency support</td>
<td>Level of Agency Support</td>
<td>Not supported: Not supported by CCD, RTD, or DDP.</td>
<td>Not strongly supported: Not strongly supported by CCD, RTD, or DDP. Highest support: Strongly supported by CCD and DDP. Supported by RTD because of improved guideway geometry as compared to the other build alternatives.</td>
<td>Second highest support: Not as strongly supported by CCD or DDP when compared to the Center Running Alternative. Supported by RTD because of improved guideway geometry as compared to the other build alternatives.</td>
<td>Not supported: Not supported by CCD or DDP. Neutral support by RTD.</td>
<td>Not supported: Not supported by CCD, RTD, or DDP.</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>No Build</th>
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<th>Alternative Center Running</th>
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<th>Partial Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of Public Support as demonstrated at public meetings and hearings</td>
<td>Minimal support</td>
<td>Minimal support</td>
<td>Strong support</td>
<td>Moderate support</td>
<td>Moderate support</td>
<td>Not presented during Level 1 screening; recommended alternative in 2010 16th Street Urban Design Plan (CCD et al.)</td>
<td></td>
</tr>
<tr>
<td>Ability to meet the Project Purpose and Need</td>
<td>Satisfies the Project Purpose and Need</td>
<td>Does not satisfy any Purpose and Need elements.</td>
<td>Ranks third in fulfillment of the Purpose and Need. Replaces failing infrastructure. Improves pedestrian safety and mobility on asymmetrical blocks through wider sidewalks; does not physically separate pedestrian walk from transit way on narrow side of asymmetrical block. Supports future transit mobility. Does not meet requirements for sidewalk and patio/gathering space width. Does not adhere to best practices for natural surveillance and public activation on median blocks. Does not provide flexibility for public use as well as the alternatives with center-running blocks.</td>
<td>Ranks first in fulfillment of the Purpose and Need. Replaces failing infrastructure. Improves pedestrian safety and mobility through wider sidewalks and separation of pedestrian walks from transit ways. Supports future transit mobility. Meets requirements for adequate patio/gathering and sidewalk space. Adheres to best practices for natural surveillance and public activation. Provides flexibility for public use by allowing pedestrian walks to shift against building fronts to consolidate gathering space under trees.</td>
<td>Ranks second in fulfillment of the Purpose and Need. Replaces failing infrastructure. Improves pedestrian safety and mobility through wider sidewalks and separation of pedestrian walks from transit ways on center-running blocks and the wide side of new asymmetrical blocks; does not physically separate pedestrian walk from transit way on narrow side of asymmetrical block. Supports future transit mobility. Meets requirements for adequate patio/gathering and sidewalk space. Adheres to best practices for natural surveillance and public activation. Provides flexibility for public use by allowing pedestrian walks to shift against building fronts to consolidate gathering space under trees on center-running blocks and on wide sides of asymmetrical blocks.</td>
<td>Ranks fourth in fulfillment of the Purpose and Need. Replaces failing infrastructure in the transit ways, but not in other areas (pedestrian areas, and tree infrastructure) Does not improve pedestrian safety and mobility. Supports future transit mobility. Does not meet requirements for sidewalk and patio/gathering space width. Does not adhere to best practices for natural surveillance and public activation on median blocks. Does not provide flexibility for public use as well as the alternatives with center-running blocks.</td>
<td></td>
</tr>
<tr>
<td>Disposition</td>
<td>Carry forward as required by NEPA</td>
<td>Do not carry forward</td>
<td>Carry forward</td>
<td>Carry forward</td>
<td>Do not carry forward</td>
<td>Do not carry forward</td>
<td>Ranks last in fulfillment of the Purpose and Need. Replaces failing infrastructure in the transit ways, but not in other areas (pedestrian areas, and tree infrastructure) Does not improve pedestrian safety and mobility. Supports future transit mobility. Does not meet requirements for sidewalk and patio/gathering space width. Does not adhere to best practices for natural surveillance and public activation on median blocks. Does not provide flexibility for public use as well as the alternatives with center-running blocks.</td>
</tr>
</tbody>
</table>
One foot of sidewalk width can comfortably carry four pedestrians/minute and 240 pedestrians/hour (Gehl, 2010). Existing 8-foot walks are too narrow for peak period pedestrian volumes and do not adhere to CCD standards for 10-foot sidewalk widths downtown (CCD, 1993).

CCD counted hourly pedestrian volumes in 2015 and 2016 in representative locations on the Mall. Pedestrian volumes exceed the carrying capacity of the sidewalks on the median blocks on the east end of the Mall, reaching up to 4,100 pedestrians per hour during the peak weekday lunch hour. The west end of the Mall reaches up to 3,000 pedestrians/hour near the DUS neighborhood (Gehl, 2016). Future (2040) midday peak pedestrian volumes are estimated at 4,800 pedestrians/hour in the CBD and 4,000 pedestrians/hour in the DUS neighborhood, based on existing peak hour pedestrian volumes growing at rate of forecasted employment growth from 2015 to 2040 of 0.7 percent annually in the Central Business District (CBD) neighborhood and 1.2 percent annually in the DUS neighborhood (Table 4 of the Land Use and Socioeconomic Existing Conditions technical memorandum located in Appendix B).

The architectural standard for dining space recommends 300 square inches per diner. Common industry table sizes that meet this standard are 30 inches by 42 inches and 30 inches by 48 inches for four-person tables and 30 inches by 24 inches for two-person tables. The standard aisle width is 36 inches to 42 inches. Using the smallest industry standards of 42-inch-wide four-top table, 36-inch-wide aisle, and 24-inch-wide two-top table results in a patio width of 102 inches, or 8.5 feet, without a barrier railing, and 9 feet with a barrier railing. Additionally, patio permits currently issued by BID require 10 feet of separation from transit ways, resulting in 9-foot patios.

People prefer to gather at edges, and people inherently back away from fast-moving objects (Gehl, 2010).

Eighty-eight percent of panhandling occurs on median blocks (Downtown Denver Business Improvement District Downtown Ambassadors, 16th Street Mall Panhandling Surveys, March 22 – August 29, 2015 as cited in Gehl, 2016).
<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>Granite pavers with a mortar setting (full width of Mall)</th>
<th>Unit pavers with a sand setting (full width of Mall)</th>
<th>Precast concrete slabs w/pattern, color (transit); granite pavers (walks)</th>
<th>Cast-in-place concrete option A*, no pattern, color (transit); granite pavers (walks)</th>
<th>Cast-in-place concrete option B*, no pattern, color (transit); granite pavers (walks)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Economics and Approximate Cost</strong></td>
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<td></td>
</tr>
<tr>
<td>Failing pavement system in constant need of repair</td>
<td>Capital cost (millions)</td>
<td>$114 (range based on market fluctuation: $97 to $137)</td>
<td>$108 (range based on market fluctuation: $92 to $130)</td>
<td>$98 (range based on market fluctuation: $83 to $118)</td>
<td>$88 (range based on market fluctuation: $75 to $106)</td>
<td>$92 (range based on market fluctuation: $78 to $110)</td>
</tr>
<tr>
<td></td>
<td>Annual transit way and sidewalk maintenance cost</td>
<td>$309,000</td>
<td>$309,000</td>
<td>$106,000</td>
<td>$85,000</td>
<td>$196,000</td>
</tr>
<tr>
<td></td>
<td>Future transit way replacement cost (millions)</td>
<td>$0</td>
<td>$0</td>
<td>$15.5</td>
<td>$20.0</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>40-year investment (millions)</td>
<td>$126.4 (range based on market fluctuation: $107 to $152)</td>
<td>$120.4 (range based on market fluctuation: $102 to $144)</td>
<td>$117.8 (range based on market fluctuation: $100 to $141)</td>
<td>$111.4 (range based on market fluctuation: $95 to $134)</td>
<td>$99.8 (range based on market fluctuation: $85 to $120)</td>
</tr>
<tr>
<td><strong>Safety and Security</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Poor delineation between undersized* pedestrian walks and transit causes near misses between pedestrians and transit vehicles</td>
<td>Delineation between pedestrians and transit</td>
<td>Options for delineation between pedestrian and transit areas: Retain existing 4-inch curb; Install higher curb between walks and transit; Barrier or bollards between walks and transit; Shift pedestrian walks adjacent to storefronts; Install trees, lights, and other furnishings between walks and transit; Provide visual and/or tactile difference in materials between walks and transit; Use technology to delineate walks and transit, such as colored lights.</td>
<td>Same options for delineation between pedestrian and transit areas as Granite Pavers option.</td>
<td>Different materials visually delineate pedestrian and transit areas. Same options for delineation between pedestrian and transit areas as Granite Pavers option.</td>
<td>Different materials visually delineate pedestrian and transit areas. Same options for delineation between pedestrian and transit areas as Granite Pavers option.</td>
<td>Different materials visually delineate pedestrian and transit areas. Same options for delineation between pedestrian and transit areas as Granite Pavers option.</td>
</tr>
<tr>
<td>Category</td>
<td>Criteria</td>
<td>Granite pavers with a mortar setting (full width of Mall)</td>
<td>Unit pavers with a sand setting (full width of Mall)</td>
<td>Precast concrete slabs w/pattern, color (transit); granite pavers (walks)</td>
<td>Cast-in-place concrete option A, no pattern, color (transit); granite pavers (walks)</td>
<td>Cast-in-place concrete option B, no pattern, color (transit); granite pavers (walks)</td>
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<tr>
<td>Slick pavement surface causes pedestrian slips and falls, and bus traction problems; this is compounded by snowy or icy conditions in winter</td>
<td>Pavement surface reduces “slip, trip and fall” risks</td>
<td>The existing granite pavers have a Thermal finish. Other finishes have a greater coefficient of friction than the existing surface. In addition, grooves and additional texture can be added in key areas to increase traction for buses.</td>
<td>Multiple finishes and textures are available from concrete, clay, or stone pavers, all of which have a greater coefficient of friction than the existing surface. In addition, grooves and additional texture can be added in key areas to increase traction for buses.</td>
<td>In the transit ways, multiple finishes and textures are available with precast concrete, that all have a greater coefficient of friction than the existing surface. In addition, grooves and additional texture can be added in key areas while finishing the concrete surface to increase traction for buses. Pavers in the pedestrian areas would use a finish with a greater coefficient of friction than the existing surface.</td>
<td>In the transit ways, concrete finish has a greater coefficient of friction than the existing surface. In addition, grooves and additional texture can be added in key areas while finishing the concrete surface to increase traction for buses. Pavers in the pedestrian areas would use a finish with a greater coefficient of friction than the existing surface.</td>
<td>In the transit ways, concrete finish has a greater coefficient of friction than the existing surface.</td>
</tr>
<tr>
<td>Transit mobility and operations</td>
<td></td>
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</tr>
<tr>
<td>Frequent maintenance disrupts transit operations, and would be more disruptive as ridership increases</td>
<td>Maintenance effects on bus operations efficiency and requirements</td>
<td></td>
<td>Frequency of pavement maintenance substantially reduced from current conditions. Portions of mortar in joints must be replaced as part of routine maintenance.</td>
<td>Frequency of pavement maintenance substantially reduced from current conditions. Routine maintenance includes repairing and sealing cracks and spalling. Periodic maintenance, for example, concrete panel replacement, required every 5 to 10 years would affect bus operations. Reconstruction of pavement system likely to occur once in 40-year lifespan, substantially disrupting bus operations during construction.</td>
<td>Frequency of pavement maintenance substantially reduced from current conditions. Routine maintenance includes repairing and sealing cracks and spalling. Reconstruction of pavement system likely to occur once in 40-year lifespan, substantially disrupting bus operations during construction.</td>
<td>Frequency of pavement maintenance substantially reduced from current conditions. Routine maintenance includes repairing and sealing cracks and spalling. Periodic maintenance, for example, concrete removal and overlay, required every 5 to 10 years would affect bus operations. No future reconstruction needed.</td>
</tr>
<tr>
<td>During construction the efficiency of transit operations would be dramatically reduced</td>
<td>Minimum disruption during construction</td>
<td>Longer construction disruption on 16th Street than concrete; similar construction duration to unit pavers.</td>
<td>Longer construction disruption on 16th Street than concrete; similar construction duration to granite pavers.</td>
<td>Shortest construction disruption on 16th Street than concrete, as concrete panels are poured and formed offsite.</td>
<td>Shorter construction disruption on 16th Street than pavers; slightly longer disruption than precast concrete.</td>
<td>Shorter construction disruption on 16th Street than pavers; slightly longer disruption than precast concrete.</td>
</tr>
<tr>
<td>Category</td>
<td>Criteria</td>
<td>Granite pavers with a mortar setting (full width of Mall)</td>
<td>Unit pavers with a sand setting (full width of Mall)</td>
<td>Precast concrete slabs w/pattern, color (transit); granite pavers (walks)</td>
<td>Cast-in-place concrete option A*, no pattern, color (transit); granite pavers (walks)</td>
<td>Cast-in-place concrete option B*, no pattern, color (transit); granite pavers (walks)</td>
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</tr>
<tr>
<td>Community and Environment</td>
<td>Construction impacts</td>
<td>Longer construction disruption on 16th Street than concrete; similar construction duration to unit pavers.</td>
<td>Longer construction disruption on 16th Street than concrete; similar construction duration to granite pavers.</td>
<td>Shortest construction disruption on 16th Street, as concrete panels are poured and formed offsite.</td>
<td>Shorter construction disruption on 16th Street than pavers; slightly longer disruption than precast concrete.</td>
<td>Shorter construction disruption on 16th Street than pavers; slightly longer disruption than precast concrete.</td>
</tr>
<tr>
<td>Environmental impacts</td>
<td>Historic resources impacts</td>
<td>Most consistent with existing design and pattern. Granite pavers can be installed with similar size, color and pattern, with changes to the finish to reduce slips and falls.</td>
<td>Smaller unit pavers can be similar color and overall pattern as existing. Smaller paver sizes would impact pattern of jointing.</td>
<td>Can be produced to match the overall pattern. Slight color change and texture change may occur with granite pavers at pedestrian areas.</td>
<td>Replicating pattern may be cost prohibitive and technically difficult. This would require multiple separate concrete pours and consistency of coloring that may be difficult. Precision of jointing pattern would be difficult to achieve.</td>
<td>Replicating pattern may be cost prohibitive and technically difficult. This would require multiple separate concrete pours and consistency of coloring that may be difficult. Precision of jointing pattern would be difficult to achieve.</td>
</tr>
<tr>
<td>Public and agency support</td>
<td>Level of Agency Support</td>
<td>Granite pavers for the surface treatment are supported to a much higher degree by CCD than concrete.</td>
<td>RTD does not support unit pavers in the transit ways.</td>
<td>RTD supports concrete, especially for the transit guideway.</td>
<td>RTD supports concrete, especially for the transit guideway.</td>
<td>RTD supports concrete, especially for the transit guideway.</td>
</tr>
</tbody>
</table>

*Cast-in-place Concrete Option A comprises standard concrete construction, with routine maintenance and two replacements during the 40-year lifespan. Cast-in-place Concrete Option B comprises a thicker concrete slab, and would not need replacement during the 40-year lifespan with routine maintenance.*
Table 6-4. Curb Options

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>Vertical Curb</th>
<th>Flat Pan</th>
<th>Hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure</td>
<td>Utilities</td>
<td>Impacts to utilities would be the same under all curb options because the level of excavation during construction activities would be the same.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Drainage</td>
<td>Design features for drainage would be the same for all curb options. The drainage flowline and inlets would move to the new edge of transit way, and surface runoff would drain into new inlets contained within the 2-foot-wide linear vertical curb or pan strip. Under any of the curb options, some areas of the Mall could be designed with supplemental drainage to remain in its existing location, and surface runoff would drain into or in line with the proposed tree wells.</td>
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</tr>
<tr>
<td>Infrastructure</td>
<td>Maintenance</td>
<td>Existing transit way maintenance is most frequent along the drainage flow lines because water gathers along the flow lines and seeps into the sub-base more frequently in these locations, which correspond with the wheel loads of the Free MallRide shuttles. The new pavement system would address this problem in the same manner for all curb options by allowing water to drain into the storm sewer system after it penetrates the surface pavers. Maintenance activities in the transit way would require closure of one lane of transit during the maintenance period. No difference in other maintenance activities (examples: snow removal, drainage inlets, granite maintenance).</td>
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<tr>
<td>Category</td>
<td>Criteria</td>
<td>Vertical Curb</td>
<td>Flat Pan</td>
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<tr>
<td>Safety</td>
<td>Pedestrians, including ADA</td>
<td>Separation of pedestrian walkways from transit way by an amenity zone would increase safety and be consistent with guidance (FHWA, 2013 and 2017; NACTO, 2013 and 2016; RTD, 2016a). Vertical curbs are the traditional means of delineating pedestrian areas from vehicular areas for visually impaired users, although this curb would be undersized and blend in with the surrounding pattern, negating its use as a visual delineation. Additionally, tactile walking surface indicators and detectable edges, consisting of textures changes in the pavement, would delineate the pedestrian walkway from the amenity zone and the amenity zone from the transit way, to assist visually impaired users in wayfinding, consistent with guidance (FHWA, 2017). Vertical curbs create a tripping hazard for pedestrians, particularly during large public events when transit is moved off the Mall to create a pedestrian-only environment. New pavers with increased friction to prevent slips and falls. Fixed furnishings to provide physical barrier against errant vehicles.</td>
<td>Separation of pedestrian walkways from transit way by an amenity zone would increase safety and be consistent with guidance (FHWA, 2013 and 2017; NACTO, 2013 and 2016; RTD, 2016a). No vertical curb to alert visually impaired users to edge of transit way location. Tactile walking surface indicators and detectable edges, consisting of textures changes in the pavement, would delineate the pedestrian walkway from the amenity zone and the amenity zone from the transit way, to assist visually impaired users in wayfinding, consistent with guidance (FHWA, 2017). The pan option reduces tripping hazard for pedestrians. New pavers with increased friction to prevent slips and falls. Fixed furnishings to provide physical barrier against errant vehicles.</td>
<td>Separation of pedestrian walkways from transit way by an amenity zone would increase safety and be consistent with guidance (FHWA, 2013 and 2017; NACTO, 2013 and 2016; RTD, 2016a). Design comprises a vertical curb at designated shuttle stops and cross streets and a pan for the rest of each block (as described in vertical curb and pan columns).</td>
</tr>
<tr>
<td>Community</td>
<td>Separation of pedestrian</td>
<td></td>
<td></td>
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<tr>
<td>Category</td>
<td>Criteria</td>
<td>Vertical Curb</td>
<td>Flat Pan</td>
<td>Hybrid</td>
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</tr>
<tr>
<td>Safety</td>
<td>Transit Shuttle Operation</td>
<td>Vertical curbs provide a small physical barrier to contain Free MallRide shuttles in the transit way if they slip on the pavement during inclement weather. New pavers with increased friction to prevent bus sliding during inclement weather.</td>
<td>The pan design option maintains linear elements of pattern at the edge of transit way. New pavers with increased friction to prevent bus sliding during inclement weather.</td>
<td>Vertical curbs at designated shuttle stops provide a small physical barrier to contain Free MallRide shuttles in the transit way if they slip on the pavement during inclement weather. New pavers with increased friction to prevent bus sliding during inclement weather.</td>
</tr>
<tr>
<td>Mobility</td>
<td>Pedestrians, including ADA Community</td>
<td>Wheelchair users can only cross the transit way at the ends of blocks and at alleys. Visually impaired users will have both the curb and tactile walking-surface indicators and detectable edges, consisting of texture changes in the pavement, to guide them.</td>
<td>Wheelchair users can cross the transit way anywhere, not just at the ends of blocks and at alleys. Visually impaired users will have tactile walking-surface indicators and detectable edges, consisting of texture changes in the pavement, to guide them.</td>
<td>Wheelchair users can cross the transit way almost anywhere, not just at the ends of blocks and at alleys. Visually impaired users will have tactile walking-surface indicators and detectable edges, consisting of texture changes in the pavement, to guide them.</td>
</tr>
<tr>
<td>Category</td>
<td>Criteria</td>
<td>Vertical Curb</td>
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<tr>
<td>Mobility (continued)</td>
<td>Transit Shuttle</td>
<td>Vertical curb provides visual and physical guidance for bus drivers. Adjacent</td>
<td>The pan option maintains linear elements of pattern at the edge of the transit way to visually delineate the transit way. Adjacent furnishings in the amenity zone create a vertical edge to provide visual guidance for bus drivers. New pavers with increased friction prevent bus sliding during inclement weather.</td>
<td>Vertical curb provides visual and physical guidance for bus drivers at designated shuttle stops. The pan maintains linear elements of pattern at the edge of the transit way to visually delineate the transit way. Adjacent furnishings in the amenity zone create a vertical edge to provide visual guidance for bus drivers. New pavers with increased friction prevent bus sliding during inclement weather.</td>
</tr>
<tr>
<td></td>
<td>Operation</td>
<td>furnishings in the amenity zone create another vertical edge to provide visual</td>
<td>Adjacent furnishings in the amenity zone create a vertical edge to provide visual guidance for bus drivers. New pavers with increased friction prevent bus sliding during inclement weather.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>guidance for bus drivers. Shuttl[es can use curbs to gain traction during slippery conditions. New pavers with increased friction prevent bus sliding during inclement weather.</td>
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<tr>
<td></td>
<td></td>
<td>Vertical curb provides visual and physical guidance for bus drivers at designated shuttle stops. The pan maintains linear elements of pattern at the edge of the transit way to visually delineate the transit way. Adjacent furnishings in the amenity zone create a vertical edge to provide visual guidance for bus drivers. New pavers with increased friction prevent bus sliding during inclement weather.</td>
<td>Shuttl[es can use curbs to gain traction during slippery conditions at designated shuttle stops where they stop and start. New pavers with increased friction prevent bus sliding during inclement weather.</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Criteria</td>
<td>Vertical Curb</td>
<td>Flat Pan</td>
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</tr>
<tr>
<td>Mobility (continued)</td>
<td>Boarding and Alighting Transit Shuttles</td>
<td>Shuttle boarding and alighting can occur anywhere on the curb on the Mall, but generally occurs at clearly delineated shuttle stops. Same height to step on and off the shuttle as existing conditions.</td>
<td>Shuttle boarding and alighting can occur anywhere on the Mall, but generally occurs at clearly delineated shuttle stops. No curb or platform to step on and off the shuttle. The steps will be 14 inches from the Mall’s surface under normal driving height 11.25 inches when the bus is kneeling, compared to 10 inches under current conditions for normal driving height and 7.25 inches when kneeling. If the bus needs to kneel to the special needs of a passenger with a disability, a short delay would occur; the bus requires 3 seconds to kneel and another 3 seconds to come back up to driving height.</td>
<td>Shuttle boarding and alighting can occur anywhere on the Mall, but generally occurs at clearly delineated shuttle stops. Same height to step on and off the shuttle as existing conditions at designated shuttle stops.</td>
</tr>
<tr>
<td>Public Use</td>
<td>Flexibility of space for public use</td>
<td>Provides a less flexible space for current and future public use than the other curb options, with a vertical curb separating the spaces within the Mall and preventing the flexibility during special events that a flat surface with no curb would provide.</td>
<td>Provides a more flexible space for current and future public use than the vertical curb option, with a flat surface across the width of the Mall for pedestrian use during public events that temporarily close the Mall to transit service and other vehicles.</td>
<td>Provides a more flexible space for current and future public use than the vertical curb option, with a flat surface across the width of the Mall for pedestrian use during public events that temporarily close the Mall to transit service and other vehicles.</td>
</tr>
<tr>
<td>Category</td>
<td>Criteria</td>
<td>Vertical Curb</td>
<td>Flat Pan</td>
<td>Hybrid</td>
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</tr>
<tr>
<td>Adaptability of space to future public use/needs</td>
<td>Use of transit way is restricted to transit use between the curbs.</td>
<td>More adaptable space for changed future conditions related to transit technology, entertainment, and public amenities. Corridors without vertical curbs can be viewed by the public as having a unique setting and as a more interesting public space, compared to corridors with a vertical curb, with the potential to attract more people to the space (DVRPC, 2018). Additional users on the Mall can translate to additional revenue from transit service to and from the Mall.</td>
<td>More adaptable space for changed future conditions related to transit technology, entertainment, and public amenities. Corridors without vertical curbs can be viewed by the public as having a unique setting and as a more interesting public space, compared to corridors with a vertical curb, with the potential to attract more people to the space (DVRPC, 2018). Additional users on the Mall can translate to additional revenue from transit service to and from the Mall.</td>
<td></td>
</tr>
<tr>
<td>Impact to the 16th Street Historic Property</td>
<td>Pavement pattern</td>
<td>The vertical curb would be located within a linear 2-foot strip of curb that would mimic the existing pavement pattern. The pan would be located within a linear 2-foot strip of curb that would mimic the existing pavement pattern. This pan would be in the exact same location on the center-running bocks as the current pan between the transit ways and the median.</td>
<td>The pan would be located within a linear 2-foot strip of curb that would mimic the existing pavement pattern. This pan would be in the exact same location on the center-running bocks as the current pan between the transit ways and the median.</td>
<td>The vertical curb and pan would be located within a linear 2-foot strip of curb that would mimic the existing pavement pattern. This pan would be in the exact same location on the center-running bocks as the current pan between the transit ways and the median.</td>
</tr>
</tbody>
</table>
The vertical curb mimics the existing curbs that are on the outer edges of the existing transit ways. Stormwater collection would occur at the edge of the realigned transit way. Inlet covers would be designed to mimic materials, pattern and color, as applicable.

The pan mimics the existing pan on the inner edges of the existing transit ways by the median. Stormwater collection would occur at the edge of the realigned transit way. Inlet covers would be designed to mimic materials, pattern and color, as applicable.

The vertical curb and pan mimic the existing curbs and pan on the edges of the existing transit way. Stormwater collection would occur at the edge of the realigned transit way. Inlet covers would be designed to mimic materials, pattern and color, as applicable.

The following are new edge delineations common to all curb option concepts:
- Truncated domes at designated crossings
- Truncated domes at designated shuttle stops
- Optional directional indicator
- Amenity zone with fixed furnishings
- Textured delineation between the transit way and amenity zone

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>Vertical Curb</th>
<th>Flat Pan</th>
<th>Hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granite Special Units</td>
<td></td>
<td>The vertical curb mimics the existing curbs that are on the outer edges of the existing transit ways. Stormwater collection would occur at the edge of the realigned transit way. Inlet covers would be designed to mimic materials, pattern and color, as applicable.</td>
<td>The pan mimics the existing pan on the inner edges of the existing transit ways by the median. Stormwater collection would occur at the edge of the realigned transit way. Inlet covers would be designed to mimic materials, pattern and color, as applicable.</td>
<td>The vertical curb and pan mimic the existing curbs and pan on the edges of the existing transit way. Stormwater collection would occur at the edge of the realigned transit way. Inlet covers would be designed to mimic materials, pattern and color, as applicable.</td>
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</table>

**New Edge Delineations**

The following are new edge delineations common to all curb option concepts:
- Truncated domes at designated crossings
- Truncated domes at designated shuttle stops
- Optional directional indicator
- Amenity zone with fixed furnishings
- Textured delineation between the transit way and amenity zone

### Table 6-5. LPA Design Options

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>LPA: Center Running and New Asymmetrical Alternative</th>
<th>LPA Design Option 1: Reduced narrow side amenity zone</th>
<th>LPA Design Option 2: Reduced narrow side patio space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics and Cost</td>
<td>Capital cost (millions)</td>
<td>$114 (range based on market fluctuation: $97 to $137)</td>
<td>Not a discriminator: Comparable to the proposed LPA</td>
<td>Not a discriminator: Comparable to the proposed LPA</td>
</tr>
<tr>
<td></td>
<td>Annual transit way and sidewalk maintenance cost</td>
<td>$309,000</td>
<td>Not a discriminator: Comparable to the proposed LPA</td>
<td>Not a discriminator: Comparable to the proposed LPA</td>
</tr>
<tr>
<td>Category</td>
<td>Criteria</td>
<td>LPA: Center Running and New Asymmetrical Alternative</td>
<td>LPA Design Option 1: Reduced narrow side amenity zone</td>
<td>LPA Design Option 2: Reduced narrow side patio space</td>
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<td>------------------------------------------------------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td>Future transit way replacement cost</td>
<td>$0</td>
<td>Not a discriminator: Comparable to the proposed LPA</td>
<td>Not a discriminator: Comparable to the proposed LPA</td>
<td>Not a discriminator: Comparable to the proposed LPA</td>
</tr>
<tr>
<td>40-year investment</td>
<td>$126.4 (range based on market fluctuation: $107 to $152)</td>
<td>Not a discriminator: Comparable to the proposed LPA</td>
<td>Not a discriminator: Comparable to the proposed LPA</td>
<td>Not a discriminator: Comparable to the proposed LPA</td>
</tr>
<tr>
<td>Outdated infrastructure does not meet current ADA requirements and leads to poor tree health; lack of water quality treatment and modern fiber optic and communications utilities doesn’t meet modern-day needs</td>
<td>Ability to address ADA deficiencies&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Not a discriminator: Can address ADA deficiencies</td>
<td>Not a discriminator: Can address ADA deficiencies</td>
<td>Not a discriminator: Can address ADA deficiencies</td>
</tr>
<tr>
<td></td>
<td>Tree infrastructure is updated to modern standards.</td>
<td>Not a discriminator: Installs modern tree infrastructure and new trees; conflicting utilities would be relocated.</td>
<td>Not a discriminator: Installs modern tree infrastructure and new trees; conflicting utilities would be relocated.</td>
<td>Not a discriminator: Installs modern tree infrastructure and new trees; conflicting utilities would be relocated.</td>
</tr>
<tr>
<td></td>
<td>Add fiber optic utility infrastructure and update/increase electric utility capabilities.</td>
<td>Not a discriminator: Installs new fiber optic and upgraded electric utilities conduit.</td>
<td>Not a discriminator: Installs new fiber optic and upgraded electric utilities conduit.</td>
<td>Not a discriminator: Installs new fiber optic and upgraded electric utilities conduit.</td>
</tr>
</tbody>
</table>

**Safety and Security**

<p>| Poor delineation between undersized pedestrian walks and transit causes near misses between | Pedestrian overflow into transit ways | Not a discriminator: Center-running blocks: 10-foot-minimum pedestrian walks accommodate | Not a discriminator: Center-running blocks: 10-foot-minimum pedestrian walks accommodate | Not a discriminator: Center-running blocks: 10-foot-minimum pedestrian walks accommodate |</p>
<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>LPA: Center Running and New Asymmetrical Alternative</th>
<th>LPA Design Option 1: Reduced narrow side amenity zone</th>
<th>LPA Design Option 2: Reduced narrow side patio space</th>
</tr>
</thead>
<tbody>
<tr>
<td>pedestrians and transit vehicles</td>
<td>pedestrians without overflow into transit ways. New Asymmetrical blocks: 10-foot walkways on asymmetrical blocks accommodate pedestrians without overflow into transit ways.</td>
<td>pedestrians without overflow into transit ways. New Asymmetrical blocks: 10-foot walkways on asymmetrical blocks accommodate pedestrians without overflow into transit ways.</td>
<td>pedestrians without overflow into transit ways. New Asymmetrical blocks: 10-foot walkways on asymmetrical blocks accommodate pedestrians without overflow into transit ways.</td>
<td>pedestrians without overflow into transit ways. New Asymmetrical blocks: 10-foot walkways on asymmetrical blocks accommodate pedestrians without overflow into transit ways.</td>
</tr>
<tr>
<td>Delineation between pedestrians and transit</td>
<td>Center-running blocks: Pedestrian walks separated by amenity zones as recommended by guidance. New Asymmetrical blocks: Pedestrian walks separated by amenity zones as recommended by guidance.</td>
<td>Center Running Blocks: Pedestrian walks separated and delineated by amenity zones as recommended by guidance. Proposed Asymmetrical: Pedestrian walks on wide side of block are separated by amenity zones as recommended by guidance. Pedestrian walks on narrow side of block physically separated from the transit way by a 3-foot buffer. The buffer is not wide enough to act as an amenity zone for multiuse fixed furnishings, lights, or a row of trees, which could provide delineation between the</td>
<td></td>
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<tr>
<td>Category</td>
<td>Criteria</td>
<td>LPA: Center Running and New Asymmetrical Alternative</td>
<td>LPA Design Option 1: Reduced narrow side amenity zone</td>
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<tr>
<td></td>
<td></td>
<td>pedestrian walkway and transit way. A row of vertical bollards would provide safe separation and delineation of the pedestrian walkway from transit way.</td>
<td>Not a discriminator: Comprised of granite pavers with a higher friction finish.</td>
<td>Not a discriminator: Comprised of granite pavers with a higher friction finish.</td>
</tr>
<tr>
<td>Slick pavement surface causes pedestrian slips and falls, bus traction problems, compounded by snowy or icy conditions in winter</td>
<td>Pavement surface reduces “slip, trip and fall” risks</td>
<td>Not a discriminator: Comprised of granite pavers with a higher friction finish.</td>
<td>Not a discriminator: Comprised of granite pavers with a higher friction finish.</td>
<td>Not a discriminator: Comprised of granite pavers with a higher friction finish.</td>
</tr>
<tr>
<td>Safety and security systems should be upgraded to current standards.</td>
<td>Ability to accommodate future technology for security best practices</td>
<td>Not a discriminator: Installs new fiber optic and upgraded electric utilities conduit.</td>
<td>Not a discriminator: Installs new fiber optic and upgraded electric utilities conduit.</td>
<td>Not a discriminator: Installs new fiber optic and upgraded electric utilities conduit.</td>
</tr>
</tbody>
</table>
### Transit mobility and operations

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>LPA: Center Running and New Asymmetrical Alternative</th>
<th>LPA Design Option 1: Reduced narrow side amenity zone</th>
<th>LPA Design Option 2: Reduced narrow side patio space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance effects on bus operations efficiency and requirements</td>
<td>Not a discriminator: Frequency of pavement maintenance impacts on bus operations substantially reduced from current conditions.</td>
<td>Not a discriminator: Frequency of pavement maintenance impacts on bus operations substantially reduced from current conditions.</td>
<td>Not a discriminator: Frequency of pavement maintenance impacts on bus operations substantially reduced from current conditions.</td>
<td></td>
</tr>
<tr>
<td>The demand for transit services is projected to increase to 70,000 riders/day in 2035</td>
<td>Provision of connectivity between DUS and CCS, and crossing bus and light rail routes in between</td>
<td>Not a discriminator: Maintains existing connections. Service expansion options compromise operating buses in tandem or procuring larger buses.</td>
<td>Not a discriminator: Maintains existing connections. Service expansion options compromise operating buses in tandem or procuring larger buses.</td>
<td>Not a discriminator: Maintains existing connections. Service expansion options compromise operating buses in tandem or procuring larger buses.</td>
</tr>
<tr>
<td>Accommodation of tandem and/or larger buses at bus stops</td>
<td>Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (trees, lights) prevent bus boarding.</td>
<td>Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (bollards, trees, lights) prevent bus boarding.</td>
<td>Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (trees, lights) prevent bus boarding.</td>
<td></td>
</tr>
<tr>
<td>Transit operations would become increasingly difficult as the volume of passengers and pedestrian use increases on the Mall</td>
<td>Effect on transit operations</td>
<td>Bus drivers need to protect only the curb side of the bus.</td>
<td>Bus drivers need to protect only the curb side of the bus.</td>
<td>Bus drivers need to protect only the curb side of the bus.</td>
</tr>
<tr>
<td>Category</td>
<td>Criteria</td>
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<tr>
<td>During construction the efficiency of transit operations would be</td>
<td>Minimum disruption during construction</td>
<td>Not a discriminator: Major impact during the</td>
<td>Not a discriminator: Major impact during the</td>
<td>Not a discriminator: Major impact during the</td>
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<td>dramatically reduced</td>
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<td>construction period.</td>
<td>construction period.</td>
<td>construction period.</td>
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</table>
| **Pedestrian mobility** | Sidewalks are undersized for pedestrian volumes and CCD standards (10-foot sidewalks downtown)". | Pedestrian volumes and accessibility guidelines are accommodated | Center-running blocks: Pedestrian volumes and CCD standards are accommodated - 2,400 pedestrians/hour on 10-foot sidewalks next to patio/gathering space, with additional space for pedestrians, shuttle stops, and/or amenities. | Proposed New Asymmetrical blocks: Pedestrian volumes and CCD standards are accommodated except at bus stops - 2,400 pedestrians/hour on 10-foot sidewalks. The narrow 3-foot buffer between the pedestrian walkway and transit way does not provide adequate space at bus stops, resulting in more bus passengers standing in the pedestrian walkway at bus stops, reducing sidewalk capacity and
<p>| | | | Center-running blocks: Pedestrian volumes and CCD standards are accommodated - 2,400 pedestrians/hour on 10-foot sidewalks next to patio/gathering space, with additional space for pedestrians, shuttle stops, and/or amenities. | Center-running blocks: Pedestrian volumes and CCD standards are accommodated - 2,400 pedestrians/hour on 10-foot sidewalks next to patio/gathering space, with additional space for pedestrians, shuttle stops, and/or amenities. |</p>
<table>
<thead>
<tr>
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<th>LPA Design Option 2: Reduced narrow side patio space</th>
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<td>hindering pedestrian mobility.</td>
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<td>The introduction of vertical bollards reduces pedestrian permeability across the Mall.</td>
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<td>Category</td>
<td>Criteria</td>
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<tr>
<td><strong>Public Use Functionality</strong></td>
<td>Limited usability of divided public space on median blocks and narrow sides of asymmetrical blocks to accommodate patio/gathering space and pedestrian needs.</td>
<td>Center-running Blocks: Walkways on both sides of blocks are wide enough for 9-foot patio/gathering space and 10-foot pedestrian walk, with additional space for amenity zone. New Asymmetrical Blocks: Walkways on both sides of asymmetrical blocks are wide enough to accommodate 9-foot patio/gathering space and 10-foot pedestrian walk, with additional space for amenity zone.</td>
<td>Center-running Blocks: Walkways on both sides of blocks are wide enough for 9-foot patio/gathering space and 10-foot pedestrian walk, with additional space for amenity zone. Proposed New Asymmetrical Blocks: Walkways on both sides of asymmetrical blocks are wide enough to accommodate 9-foot patio/gathering space and 10-foot pedestrian walk, with limited space for an undersized amenity zone.</td>
<td>Center-running Blocks: Walkways on both sides of blocks are wide enough for 9-foot patio/gathering space and 10-foot pedestrian walk, with additional space for amenity zone. Proposed New Asymmetrical Blocks: Walkways on the wide side of asymmetrical blocks are wide enough to accommodate 9-foot patio/gathering space and 10-foot pedestrian walk, with additional space for amenity zone. Walkways on the narrow side asymmetrical blocks not wide enough to accommodate a 10-foot pedestrian walk, a 5-foot amenity zone, and a 9-foot patio/gathering area. Patio/gathering area would be 7 feet. Reducing the patio space by 2 feet.</td>
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<td>Width for patio and gathering space</td>
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<td>reduces the seating capacity by one-third, resulting in less public activation; patio space has been demonstrated to be the most activating space for public use. Maintains an inequity in the public use of the asymmetrical blocks, with the narrow side continuing to have less capacity for public use and be less desirable.</td>
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<tr>
<td>Negative perception of safety and lack of natural surveillance inhibits positive public use of Mall.</td>
<td>Adherence to best practices for natural surveillance, activation, and positive public use of pedestrian and gathering areas.</td>
<td>Center-running Blocks: Replaces public space in medians with consolidated public space adjacent to buildings, increasing natural surveillance and adhering to safety and security best practices. New Asymmetrical Blocks: Increases opportunities for positive public use and activities on the Mall, increasing natural surveillance and adhering to safety and security best practices.</td>
<td>Center-running Blocks: Replaces public space in medians with consolidated public space adjacent to buildings, increasing natural surveillance and adhering to safety and security best practices. New Asymmetrical Blocks: Does not increase opportunities for positive public use and activities on the Mall. Natural surveillance on the Mall would be approximately the same as under existing conditions.</td>
<td>Center-running Blocks: Replaces public space in medians with consolidated public space adjacent to buildings, increasing natural surveillance and adhering to safety and security best practices. New Asymmetrical Blocks: Reducing patio space reduces the primary generator of public activity on the Mall by one-third, resulting in a small reduction of natural surveillance activity.</td>
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</tbody>
</table>

**Community and Environment**

<p>| Construction impacts | Construction impacts | Not a discriminator: Major impact during the construction period. | Not a discriminator: Major impact during the construction period. | Not a discriminator: Major impact during the construction period. |</p>
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<tr>
<th>Category</th>
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<th>LPA Design Option 2: Reduced narrow side patio space</th>
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</thead>
<tbody>
<tr>
<td>Environmental impacts</td>
<td>Historic resources impacts</td>
<td>Center-running Blocks: Replaces median blocks. Ability to accommodate existing pavement pattern, with minor adjustments. Maintains blocks as symmetrical. New Asymmetrical Blocks: Modify historic design; can accommodate existing pavement pattern and spatial relationships, with some adjustments. Maintains blocks as asymmetrical. Relationship of the end “rooms” to the overall design: Maintains three rooms with the same transition locations and linear dimensions of the existing rooms; maintains the setting of the rooms with the historic core in center running/median blocks; maintains the viewshed of the capital and clock tower with the room</td>
<td>Center-running Blocks: Replaces median blocks. Ability to accommodate existing pavement pattern, with minor adjustments. Maintains blocks as symmetrical. New Asymmetrical Blocks: Rebuild wide side of block from edge of right of way to edge of transit way with pattern, trees, and lights in existing locations; modify historic design for remainder of cross section; modifications can accommodate existing pavement pattern and spatial relationships, with some adjustments on the narrow side. Relationship of the end “rooms” to the overall design: Maintains three rooms but changes the transition location and number of blocks (linear proportion) of the rooms; changes the sizes of the rooms and the locations of</td>
<td>Center-running Blocks: Replaces median blocks. Ability to accommodate existing pavement pattern, with minor adjustments. Maintains blocks as symmetrical. New Asymmetrical Blocks: Rebuild wide side of block from edge of right of way to edge of transit way with pattern, trees, and lights in existing locations; modify historic design for remainder of cross section; modifications can accommodate existing pavement pattern and spatial relationships, with some adjustments on the narrow side. Relationship of the end “rooms” to the overall design: Maintains three rooms but changes the transition location and number of blocks (linear proportion) of the rooms; changes the sizes of the rooms and the locations of</td>
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<td>transitions in the same locations.</td>
<td>the transitions between the center and end rooms, resulting in change in setting and continuity of the relationship between the median (reconstructed as center running) and asymmetrical blocks; also makes substantial change to the physical aspects of the linear design.</td>
<td>the transitions between the center and end rooms, resulting in change in setting and continuity of the relationship between the median (reconstructed as center running) and asymmetrical blocks; also makes substantial change to the physical aspects of the linear design.</td>
<td></td>
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</tr>
<tr>
<td>Environmental impacts</td>
<td>Socioeconomic impacts</td>
<td>Potential benefits to social, economic, and land use resources because of higher public use and perception of safety.</td>
<td>Center-running blocks provide equitable distribution of pedestrian space and public amenities, including tree canopy and gathering space, providing benefits for economic vitality of businesses on both sides of the Mall.</td>
<td>Center-running blocks provide equitable distribution of pedestrian space and public amenities, including tree canopy and gathering space, providing benefits for economic vitality of businesses on both sides of the Mall.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Center-running blocks provide equitable distribution of pedestrian space and public amenities, including tree canopy and gathering space, providing benefits for economic vitality of businesses on both sides of the Mall.</td>
<td>Does not provide space for trees or lighting to improve the public use conditions on the narrow side of asymmetrical blocks, perpetuating inequitable distribution of public space and resulting in a less desirable business location than the wide side of the blocks and disproportionate impacts to those property owners and businesses.</td>
<td>Lesser public use on the narrow side of the asymmetrical blocks impacts businesses and property owners: reduced patio zones remove 30 percent of outdoor table seating and reduce public activation on these blocks, resulting in a less desirable business location than the wide side of the blocks and disproportionate impacts to those property owners and businesses.</td>
</tr>
<tr>
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<td>Asymmetrical blocks provide trees, additional public amenity space, and a 9-foot patio/gathering space on the narrow side of the block, making business locations on the narrow side of the block more desirable than the design options.</td>
<td>Would require bollards or other vertical separation between transitway and pedestrian walkway, which introduces undesirable visual elements and physical barriers to pedestrian</td>
<td>For visual resources, views to the tower and capital are changed, and the row of trees along the length of the Mall cannot be maintained.</td>
</tr>
<tr>
<td>Category</td>
<td>Criteria</td>
<td>LPA: Center Running and New Asymmetrical Alternative</td>
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</tr>
<tr>
<td>Natural resources impacts</td>
<td>Not a discriminator: Replaces 400,000 square feet of hardscape, installs water quality treatment (benefit to water quality). No changes to other resources.</td>
<td>Not a discriminator: Replaces 400,000 square feet of hardscape, installs water quality treatment (benefit to water quality). No changes to other resources.</td>
<td>Not a discriminator: Replaces 400,000 square feet of hardscape, installs water quality treatment (benefit to water quality). No changes to other resources.</td>
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</tr>
<tr>
<td>Category</td>
<td>Criteria</td>
<td>LPA: Center Running and New Asymmetrical Alternative</td>
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<tr>
<td>Ability to meet the Project Purpose and Need</td>
<td>Satisfies the Project Purpose and Need</td>
<td>Ranks first in fulfillment of the Purpose and Need.</td>
<td>Ranks third in fulfillment of the Purpose and Need.</td>
<td>Ranks second in fulfillment of the Purpose and Need.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improves pedestrian safety and mobility through wider sidewalks and separation of pedestrian walkway from transit way.</td>
<td>Improves pedestrian safety and mobility through wider sidewalks and separation of pedestrian walkway from transit way; separation of pedestrian walkway from transit way on narrow side of asymmetrical blocks is narrow and requires vertical bollards for safe delineation.</td>
<td>Improves pedestrian safety and mobility through wider sidewalks and separation of pedestrian walkway from transit way.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Meets requirements for adequate patio/gathering, sidewalk, and amenity space.</td>
<td>Does not meet requirements for adequate patio/gathering, sidewalk, and amenity space.</td>
<td>Does not meet requirements for adequate patio/gathering, sidewalk, and amenity space.</td>
</tr>
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<td>Adheres to best practices for natural surveillance and public activation.</td>
<td>Adheres to best practices for natural surveillance and public activation.</td>
<td>Adheres to best practices for natural surveillance and public activation.</td>
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<thead>
<tr>
<th>Disposition</th>
<th>Carry forward</th>
<th>Do not carry forward</th>
<th>Carry forward</th>
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7. Locally Preferred Alternative

This section describes the LPA, including capital improvements, transit operations, traffic operations, and construction activities. Figure 7-1 illustrates the proposed alignments and delineates sidewalks and the transit way within the proposed alignments. Figure 7-2 illustrates a LPA Design Option, which extends the center running transit design for two extra blocks and rebuilds the wide side of the remaining asymmetrical blocks in place.

Figure 7-1. Locally Preferred Alternative

Note: Under the LPA Design Option the Gateway Plaza configuration (Figure 5-2) would be implemented between Cleveland Place and Broadway.
A. Capital Improvements

This section describes the capital improvements that will comprise the LPA and the LPA Design Option. The LPA and LPA Design Option differ only in alignments, transitions, and pattern on the asymmetrical blocks. Accordingly, the LPA Design Option is discussed only in Sections 7.A.1 and 7.A.2.

1. Alignments and Transitions

The primary differences between the LPA and the LPA Design Option are the alignments and transitions of the asymmetrical and center running blocks.

a) LPA

The western Project limits would be the eastern edge of the 16th Street and Market Street intersection. From Market Street to Arapahoe Street the alignment would be the new asymmetrical cross-section design (Figure 7-1). The new asymmetrical cross-section design removes the existing 6-foot median with light fixtures from between the transit way lanes, pushes the existing two transit way lanes together into a single transit way comprising two adjacent 12-foot transit ways, and increases the size of the pedestrian area on the narrow side of the cross-section from 17 to 24 feet. and reduces the pedestrian area on the wide side of the cross section from 33 feet to 32 feet.
The LPA would shift the location of the pavement pattern, trees, and lights 2 feet north on the wide side of the block, reducing the space between the buildings and first row of trees and lights by 2 feet. The LPA would add 1 foot of usable space to the amenity zone to reduce the amount of bus mirror overhang at the edge of the transit way. This 1-foot addition to the amenity zone would result from adding 1 foot to the inside edge of the transit way, providing the bus more space to travel and reducing the mirror overhang into the amenity zone.

Each pedestrian area would consist of a patio/gathering area, amenity zone with trees, and a minimum 10-foot clear, unobstructed pedestrian walkway free of encroachments from elements such as furnishings, kiosks, and shuttle stops. The patio/gathering area would be 9 feet wide on the narrow side of the block and 15 feet wide on the wide side of the block.

From Arapahoe Street to Tremont Place the alignment would be the center-running cross-section design (Figure 7-1). The center-running cross-section design places the two existing transit way lanes together into a single transit way comprising two adjacent 12-foot-wide transit ways, without a median separating them. The cross-section design has equal widths of pedestrian area, 28 feet, on each side of the block, which also allows for additional flexibility in programing the space in a manner that would allow more pedestrians to use it. Each pedestrian area would consist of 9-foot patio/gathering space, a 9-foot tree/amenity zone, and a 10-foot-wide clear, unobstructed pedestrian walkway free of encroachments from elements such as furnishings, kiosks, and shuttle stops.

From Tremont Place to Cleveland Place, the alignment would, again, be the new asymmetrical cross-section design, with a transition to the existing conditions of the half-block gateway plaza between Cleveland Place and Broadway (Figure 7-1).

The new transit way alignment would change the locations of the existing vertical curbs between the existing pedestrian walkways and transit ways. Along the edges of the transit way, the LPA would be constructed with vertical curbs, similar to those on the outside edges of the existing transit way lanes, at designated shuttle stops, cross streets, and intersections; the vertical curbs would then transition to a pan, similar to the pan on the inside edges of the existing transit way lanes but with a shallow longitudinal channel within the pan to direct water as part of the drainage system. Constructing the LPA with vertical curbs at shuttle stops and a pan along the remainder of the transit way meets requirements for both transit operations and public use programming flexibility.

The LPA would maintain the progression of a beginning, middle, and end of the Mall through the design of asymmetrical blocks at the beginning and end of the Mall and symmetrical blocks in the middle of the Mall. Transitions between cross-section designs would occur at four locations on the Mall: (1) the western Project limits at Market Street, (2) at Arapahoe Street where the cross-section design changes from new asymmetrical to center running, (3) at Tremont Place where the cross-section design changes back from center running to new asymmetrical, and (4) at Cleveland Place, where the cross-section design transitions to the Gateway Plaza. At the Arapahoe and Tremont Place transitions, the east and westbound transit way lanes would shift 4 feet, while under existing conditions the eastbound transit way lane doesn’t shift and the westbound transit way lane shifts 16 feet. At the Project limit transitions, the LPA will tie into the existing transit ways. Figure 7-3 illustrates the transition from the center-running cross-section design to the new asymmetrical cross-section design at Tremont Place.
b) LPA Design Option

From Market Street to Lawrence Street (versus Arapahoe Street in the LPA) the alignment would be a modified asymmetrical cross-section design (Figure 7-2) (versus the LPA New Asymmetrical cross-section design [Figure 7-1]). The modified asymmetrical cross-section design removes the existing 6-foot median with light fixtures from between the transit way lanes, pushes the two transit way lanes together into a single transit way comprising two adjacent 12-foot transit way lanes, and increases the size of the pedestrian area on the narrow side of the cross-section from 17 to 22 feet (versus 24 feet in the LPA).

The LPA Design Option would maintain the location of the pavement pattern, trees, and lights on the wide side of the block (versus shifting them 2 feet north in the LPA) and would add 1 foot of usable space to the amenity zone to reduce the amount of bus mirror overhang at the edge of the transit way. This 1-foot addition would not change the pavement pattern on the wide side of the block because 1 foot would be added to the inside edge of the transit way,
providing the bus more space to travel and reducing the mirror overhang into the amenity zone.

Each pedestrian area would consist of a patio/gathering area, amenity zone with trees, and a 10-foot clear, unobstructed pedestrian walkway free of encroachments from elements such as furnishings, kiosks, and shuttle stops. The patio/gathering area would be 7 feet wide on the narrow side of the block (versus 9 feet in the LPA) and 15 feet wide on the wide side of the block.

From Lawrence Street to Court Place (versus Arapahoe Street to Tremont Place in the LPA) the alignment would be the center-running cross-section design (Figure 7-2). The design option would extend the center-running cross section into two blocks that are currently asymmetrical blocks: the block between Lawrence Street and Arapahoe Street and the block between Tremont Place and Court Place. The center-running cross-section design would be the same as described for the LPA in Section 7.A.1(a).

From Court Place (versus Tremont Place in the LPA) to Cleveland Place, the alignment would, again, be the modified asymmetrical cross-section design (versus the LPA New Asymmetrical cross-section design), with a transition to the existing conditions of the half-block gateway plaza between Cleveland Place and Broadway (Figure 7-2).

The design option curbs would be constructed in the same manner as described for the LPA in Section 7.A.1(a), with vertical curbs at designated shuttle stops, cross streets, and intersections and a pan along the remainder of the transit way.

The design option would maintain the progression of beginning, middle, and end “rooms” of the Mall through the design of asymmetrical blocks at the beginning and end of the Mall and symmetrical blocks in the middle of the Mall. However, the design option would change the size and locations of these rooms in comparison to existing conditions and the LPA, reducing the size of the asymmetrical beginning and end rooms by one block each, and increasing the size of the middle room by two blocks. Transitions between cross-section designs would occur at four locations on the Mall: (1) the western Project limits at Market Street, (2) at Lawrence Street (versus Arapahoe Street in the LPA) where the cross-section design changes from asymmetrical to center running, (3) at Court Place (versus Tremont Place in the LPA) where the cross-section design changes back from center running to asymmetrical, and (4) at Cleveland Place, where the cross-section design transitions to the Gateway Plaza. At the Lawrence Street and Court Place transitions, the east and westbound transit way lanes would shift 6 feet (versus 4 feet in the LPA), while under existing conditions the eastbound transit way lane doesn’t shift and the westbound transit way lane shifts 16 feet. At the Project limit transitions, the LPA Design Option will tie into the existing transit ways. Figure 7-3 illustrates the transition from the center-running cross-section design to the new asymmetrical cross-section design at Tremont Place.
2. Pavement Materials and Pattern

The LPA would be implemented with granite pavers arranged to mimic the Mall’s existing color and pattern in the transit way and pedestrian areas. The pavement pattern would honor and complement the existing character of the I.M. Pei- and Hanna/Olin-designed mall by retaining the 45-degree-diagonal grid to resemble the historic Navajo rug-themed pattern and retain the small, medium, and large diamond patterns in the same (or approximately the same) spatial relationship as the original design in the symmetrical blocks. The LPA would also retain the pattern in approximately the same spatial relationship in the asymmetrical blocks, but the overall pattern would be shifted 2 feet to the north (similar to moving a patterned carpet) on the wide side of the block to allow for the wider pedestrian area on the narrow side of the block. The LPA Design Option would not shift the pattern on the wide side of the asymmetrical blocks, and the resulting pedestrian area on the narrow side of the block would be 2 feet narrower than under the LPA. Localized minor adjustments may be required during subsequent design phases to accommodate unforeseen design challenges, infrastructure needs, compliance with federal requirements such as ADA and homeland security standards, safety improvements, and CCD and RTD criteria.

The granite pavers would have improved surface friction and would be arranged and secured on new sub-base. The existing concrete sub-base slabs would be removed and replaced, complete with a new system to drain moisture that penetrates the surface. The surface and sub-base drainage system would discharge water to inlets connected to the local storm sewer; water quality treatment features would be installed to remove pollutants and sediment from the water.

3. Trees and Tree Infrastructure

The LPA would remove the existing trees and replace them with a variety of tree species that fit within the context of the design and thrive in Colorado’s climate. Tree placement would honor the existing character of the Mall by retaining geometric and spatial relationships and the colors and aesthetic qualities of the existing tree species. The original monoculture design of red oak trees on the asymmetrical blocks and honey locusts on the symmetrical blocks would be replicated as closely as possible while maintaining current CCD tree diversity standards, which require multiple tree species to be planted in a single block. Tree diversity standards prevent single-species diseases from destroying entire blocks of trees, such as the disease that killed the majority of red oak trees on the Mall. Tree species have been selected using both current CCD forestry requirements and similar criteria to those used to select tree species during design of the original Mall. The LPA would also remove the existing tree boxes with 300-cubic-foot soil capacity and replace them with new suspended tree infrastructure that provides 1,000 cubic feet of soil volume, such as a silva cell or equivalent system. Landscape irrigation would be removed and replaced.

4. Edge Delineation

The LPA would move the edges of the transit lanes, which are currently defined by vertical curbs on their outside edges and pans on their inside edges (Figure 6-1), to new locations closer to the center of the block. The edges of the new transit way would be defined by vertical curbs.
at designated shuttle stops, cross streets and intersections, and a pan along the remainder of the transit way. The vertical curb and pan units would be constructed of rectangular granite units in the same dimensions and colors as the existing units, designed to blend into the surrounding pavement pattern. On the center-running blocks, the vertical curb and pan units would be in the exact same location as the existing pan between the transit ways and the median.

Design features for safety and ADA compliance include texture on the back of the vertical curb and pan granite units, an amenity zone with fixed furnishings to separate the transit way from the pedestrian walkway, directional indicators within 10-foot pedestrian walkways, truncated domes at designated crossings, and consideration of truncated domes at shuttle stops (Figure 7-4). The vertical curb and pan granite units would mimic the existing pattern and colors. Although pedestrians can cross the transit way at any point along the Mall, the designated crossings will be clearly marked and occur at cross streets and at the ends of each block. The separation of pedestrian walkways from the transit way by an amenity zone with fixed furnishings would increase safety and be consistent with guidance (FHWA, 2013 and 2017; NACTO, 2013 and 2016; RTD, 2016a). The textured changes in the pavement, to delineate the pedestrian walkway and the amenity zone from the transit way would assist visually impaired users in wayfinding. Transit lane indicators will guide shuttle operators in immediately adjacent transit lanes without a median separating them. The transit way indicator technique will be decided in subsequent design phases.

Figure 7-4. Transit Way Edge Delineation

Drainage inlets on the Mall currently consist of linear metal grates contained within the 2-foot-wide linear curb strip. Under the LPA, the drainage flowline and inlets would move to the new edge of the transit way and surface runoff would drain into new inlets contained within the 2-foot-wide linear vertical curb or pan strip. Additionally, some areas of the Mall could be designed with supplemental drainage to remain in its existing location, and surface runoff would drain into or in line with the proposed tree wells. The new drainage inlets would not introduce a new linear element into the historic pavement pattern, and inlets would be designed to be context sensitive or resemble the existing inlets.
5. **Utilities and Technologies of the Future**

The LPA would upsize electrical conduits and wiring to allow for expanded capacity and remove and replace landscape irrigation and drainage infrastructure. The LPA would also provide the opportunity to install fiber optic and/or telecommunications utilities to meet current and future demands. Wifi, Lidar, Infrared, and other communication systems may be installed aboveground to allow for future technologies.

Existing underground utilities (storm sewer, sanitary sewer, water mains, natural gas, and steam) would be evaluated in subsequent design phases and in coordination with utility companies. At that phase, it may be determined that these utilities should be replaced, upgraded, or preserved in place.

6. **Safety and Security**

The LPA would include a vertical curb at designated shuttle stops and cross streets; a pan at the edge of the transit way in other locations; an amenity zone between the transit way and pedestrian walkway with trees, lights, and furnishings such as benches and chairs, and delineating elements of texture on the back of the vertical curb and pan granite units; directional indicators at the edges of the 10-foot pedestrian walkways; and truncated domes at designated crossings and shuttle stops, consistent with RTD standards (2016a) and national guidance (NACTO, 2013; NACTO, 2016; FHWA, 2017).

The new granite pavers would be less slippery than the existing pavers. The amount of friction on the surface of the transit way and pedestrian areas would be determined by RTD and CCD in a subsequent design phase, to reduce incidents related to slipping and sliding of both pedestrians and vehicles.

CPTED principles promote the design, maintenance, and use of the built environment to enhance quality of life and to reduce both the incidence and fear of crime. The design of the LPA incorporates the following CPTED principles:

- **Natural surveillance** – The LPA includes clear sight lines such that all spaces in the Mall are visible to others; a person is less likely to commit a crime if they think it will be witnessed

- **Territoriality** – Placement of pedestrian walkways and gathering spaces adjacent to buildings instead of separated in a center median allows for active “ownership” of all pedestrian areas of the Mall by adjacent properties; potential trespassers perceive this ownership and are discouraged from illicit activities

- **Access control** – Use of walkways, lighting, and landscape to clearly guide where people walk and spend time on the Mall; the goal with this CPTED principle is to direct the flow of people while decreasing the opportunity for crime

- **Management and maintenance** – The current maintenance and security programs on the Mall (for example, Downtown Security Action Plan) would continue; well-managed and maintained properties make places safer

- **Activity support** – The LPA provides appealing gathering spaces that draw people to spend time on the Mall and continues active programming that brings people to the Mall, such as concerts and markets; the presence of pedestrian users engaged in activities on the Mall discourages illicit activities by people who desire anonymity for their actions
7. Lighting, Signage, and Furnishings

The existing lighting on the Mall was replicated and replaced in 2016. The LPA would reuse the existing lighting as well as provide additional lighting, as needed. New pole-based lighting fixtures would replicate the existing light fixtures. Other types of light fixtures could be incorporated into the design using CPTED principles.

The LPA would incorporate signage and furnishings; their design and locations would be determined during subsequent design phases and would comply with applicable codes, and accommodate people with disabilities, as applicable.

8. Changes to Cross Streets

Bulb-outs would be implemented on cross streets to slow traffic and reduce the crossing distance for pedestrians on those streets, except for instances where space is reserved for existing bicycle or light rail infrastructure. Bicycle and light rail transit (LRT) infrastructure would be maintained through the Project limits. The elimination of the median would consolidate pedestrian crossings to two locations at each cross-street intersection. Changes to pedestrian crossing controls such as crosswalks and crossing signals would be decided during subsequent design phases. New crossing signals will be constructed. Additional intersection improvements to slow traffic and increase pedestrian safety (for example, pavement patterns, pavement color, pavement texture, or raised pavement) would be considered during subsequent design phases.

9. Funding

CCD would use Downtown Urban Renewal Authority (DURA) Tax Incremental Financing (TIF) funds, as well as funds from the recently passed Denver 2017 General Obligation (GO) Bonds. The DURA TIF Board of Commissioners approves the use of DURA TIF funds, and those funds must be used on downtown renewal projects. The DURA TIF funds intended for this project must be spent by 2022. The use of Denver 2017 GO Bonds was recommended in the 2017 GO Bond – Mayor Recommended Package of Investments (CCD, 2017b). RTD has two federally funded grants to rehabilitate portions of the Mall, which it intends to contribute to the Project if FTA and Denver Regional Council of Governments (DRCOG) approve the transfer of funds and CCD and RTD implement an IGA. The use of FTA grant funds requires FTA approval under NEPA. Ongoing maintenance of the transit way would be funded through an IGA between CCD and RTD. The level of maintenance is expected to be significantly reduced from existing levels. Funding for maintenance of pedestrian areas would continue to be provided through an IGA between CCD and the BID. An IGA between CCD and RTD will ensure that pedestrian walkways maintain the necessary 10-foot clear width for unimpeded pedestrian traffic.

B. Transit Operations

The LPA would accommodate existing and planned Free MallRide transit operations, LRT service operations, and connecting transit service. The transit way would consist of two 12-foot transit way lanes adjacent to each other, with no median or light fixtures between them, except at the half-block triangle plaza between Cleveland Place and Broadway, where the existing area with
light fixtures between transit lanes would be reconstructed in place. A transit lane indicator between transit lanes would be applied in the transit way to aid shuttle operators by clearly defining the inside edge of the transit lanes. The transit lane indicator technique is undecided. Possible techniques include but are not limited to textured pavement, reflective surface treatments and other emerging technologies, with the intent of minimizing visual changes to the pavement pattern. Operations for the Free MallRide and connecting transit services would not change as a result of implementing the LPA and continued Free MallRide operation will be included in an IGA between RTD and CCD.

C. Traffic Operations

Implementation of the LPA would not change long-term operational characteristics of the cross streets or permitted vehicles on the Mall. Incidental uses such as bicycles, horse-drawn carriages, and pedi-cabs (which are allowed on the Mall only during offpeak transit times), would not change under the LPA. Bulb-outs and other intersection improvements to be decided during subsequent design phases would calm traffic in cross streets. Within the cross streets, capacity, lane width, and traffic controls and timing would follow the same concept of operations.

D. Construction Activities

This section describes important aspects of the construction process required to implement the LPA within the proposed construction period.

1. Timeline, Phasing, and Access

Construction of the LPA is anticipated to take 2.5 to 4 years in total. Major construction activities on each block are anticipated to last approximately 8 months to 12 months; however, minor construction activities or unforeseen utility-related construction activities may last longer. Construction will generally occur in two- to six- block segments and multiple segments may be under construction at one time; each segment will require multiple construction phases. Construction will occur within the Project limits illustrated on Figure 3-1. Construction phasing will be determined using the following assumptions:

- Maintain reasonable access to businesses during all phases of construction.
- Maintain reasonable access for traffic on cross streets during all phases of construction, except for limited intermittent closures.
- Maintain two-way Free MallRide service for a majority of the distance and Project duration, except for limited intermittent detours. Four scenarios for transit operations during construction have been used to analyze construction impacts in Section 3, Environmental Resources, and Section 4, Transportation Systems, of the EA; the scenarios are further detailed in those sections.
- Maintain LRT and other connecting transit services on the Mall, except for limited intermittent interruptions as agreed upon by the contractor and RTD, during all phases of construction.
- Maintain reasonable and regulatory compliant access for Free MallRide service, LRT service, and other connecting transit services as agreed upon by the contractor and RTD during all
phases of construction. The regulatory compliance aspects include maintaining access for people with disabilities.

The impact analysis and mitigation recommended in the Project EA are presented to allow the contractor sufficient flexibility to balance cost against schedule, community disruption and mitigation. A Project Management Plan (PMP) and Traffic Management Plan (TMP) will be developed and will include the mitigation measures committed to in Section 3, Environmental Resources, and Section 4, Transportation Systems, of the EA. The PMP and TMP will be updated as the advancement of design, construction staging, and stakeholder outreach allows for additional decisions to be made regarding impacts and measures to mitigate impacts. The PMP will also include a Public Information Plan (PIP), which will serve to prepare project-area residents, businesses, and commuters for what to expect during construction, listen to their concerns, and develop plans to minimize disruptive effects.

2. Staging

The selection of a construction staging site or sites would be decided in subsequent design phases. The process for deciding a construction staging site or sites would include applicable stakeholders (Project Partners, agencies, and affected landowners and business owners).

3. Construction Activities

Construction activities would generally include, and require equipment for: deconstruction; construction of temporary facilities for maintenance of access and safety; construction of permanent subsurface features; and construction of aboveground surface, traffic control, wayfinding, drainage, communications, lighting, and landscape features. It is anticipated that night work may be performed, and 24-hour construction may be required in some cases to accommodate the construction schedule, maintenance of access, or related stakeholder requirements. Access to the construction site will be controlled through appropriate standards set forth by the Colorado Department of Public Health and Environment, CCD Occupational Safety and Health Administration, CCD Department of Public Works, the Manual on Uniform Traffic Control Devices, the National Fire Protection Association 130 Standard for Fixed Guideway Transit and Passenger Rail Systems, and other applicable regulatory requirements. Haul routes to and from the construction site or staging site(s) will be determined during subsequent design phases. Existing haul routes will be used to the extent practicable.

E. References


City and County of Denver (CCD). 2017b. 2017 GO Bond – Mayor Recommended Package of Investments.


City and County of Denver (CCD), Regional Transportation District, Downtown Denver Partnership, and Downtown Denver Business Improvement District (CCD et al.). 2010. 16th Street Urban Design Plan: Concept Design Report, 16th Street Plan, Phase II. Denver, CO. November.


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Meeting the Challenge (MTC). 2010. A Discussion of Accessibility Issues for the 16th Street Mall Project.


Regional Transportation District (RTD). 2015. Transitway Rehabilitation Study.


Appendix C
Draft Programmatic Agreement
DRAFT

PROGRAMMATIC AGREEMENT

AMONG

THE FEDERAL TRANSIT ADMINISTRATION,

THE COLORADO STATE HISTORIC PRESERVATION OFFICER,

AND

THE ADVISORY COUNCIL ON HISTORIC PRESERVATION

REGARDING

IMPROVEMENTS TO THE 16TH STREET MALL

CITY AND COUNTY OF DENVER, COLORADO

WHEREAS, the Federal Transit Administration (FTA), as the lead federal agency, has determined that Improvements to the 16th Street Mall (collectively, such improvements are referred to herein as the Project) constitute an Undertaking under 36 Code of Federal Regulations (CFR) 800.16(y), which requires compliance with Section 106 of the National Historic Preservation Act (54 United States Code [U.S.C.] § 306108) and its implementing regulations in 36 CFR Part 800; and

WHEREAS, a group of partners comprising FTA, the Regional Transportation District (RTD), the City and County of Denver (CCD), and Downtown Denver Partnership (DDP) propose to implement improvements to the 16th Street Mall (Mall), a transit way and commercial corridor in the downtown of the City and County of Denver, Colorado, to address infrastructure, mobility, safety, and public use needs, for which RTD has received financial assistance from the FTA; and

WHEREAS, the Project is a federal Undertaking that proposes to develop and implement a flexible and sustainable design for the Mall to address deteriorating infrastructure, provide equitable and sufficient space for high-quality public gathering opportunities, improve pedestrian and vehicle safety, and continue safe and accessible two-way transit shuttle service (Free MallRide) on the Mall, while honoring the Mall’s use and iconic design; and

WHEREAS, the Project will reconstruct the entire 12.5 blocks of the historic Mall property, including the following anticipated improvements: (1) the transit way will be realigned, pedestrian walkways will be expanded, new amenity zones will be added, and existing patio spaces will be maintained; (2) subsurface drainage systems, utilities, and tree boxes and irrigation systems will be replaced; (3) the pavement surface, including granite pavers and mortar, will be replaced with similar appearing granite pavers; (4) trees will be replaced, and new trees will be added; and (5) replica light fixtures will be added and relocated as needed; and

WHEREAS, the Colorado State Historic Preservation Officer (SHPO) is authorized to enter into this Programmatic Agreement (PA) to fulfill its role of advising and assisting federal agencies in carrying out their responsibilities under 36 CFR § 800.2(c)(1)(i) and § 800.6(b); and

WHEREAS, CCD owns 16th Street, RTD operates transit service, and CCD and RTD maintain and finance maintenance for the transit way on the Mall through an intergovernmental agreement between RTD and CCD; and

WHEREAS, the Downtown Denver Partnership (DDP), through its management of the Downtown Denver Business Improvement District (BID), operates, maintains, and finances maintenance for the pedestrian zones of the Mall through an intergovernmental agreement between the BID and CCD; and

WHEREAS, RTD has received federal financial assistance from FTA and will coordinate with CCD as the sub-recipient of such federal funds. CCD will manage the design and construction of the Project; and
WHEREAS, RTD has participated with FTA in consultation for the Undertaking and has been invited to sign this PA as an Invited Signatory; and

WHEREAS, FTA and SHPO have consulted with CCD regarding the effects of the Undertaking on historic properties and have invited CCD to sign this PA as an Invited Signatory; and

WHEREAS, FTA and SHPO have consulted with DDP regarding the effects of the Undertaking on historic properties and have invited DDP to sign this PA as an Invited Signatory; and

WHEREAS, FTA and SHPO have requested the Concurring Parties to concur in this PA, indicating acceptance of the process leading to the PA and a desire and willingness to participate in future consultations if needed, but the PA may be executed, amended and/or terminated without concurrence from the Concurring Parties; and

WHEREAS, FTA and SHPO have consulted with Historic Denver, Colorado Preservation, Inc., the National Trust for Historic Preservation, the Landmark Preservation Commission, and the Lower Downtown Design Review Board as “Consulting Parties” regarding the Undertaking on historic properties, in accordance with and as defined by 36 CFR 800.6(b)(2) and have invited these parties to sign this PA as Concurring Parties; and

WHEREAS, FTA has provided for public involvement in accordance with 36 CFR 800.8(a)(1) by coordinating Section 106 consultation with public review and participation via an Environmental Assessment for the Undertaking under provisions of the National Environmental Policy Act (NEPA), 42 U.S.C. §4321 et. seq.; and

WHEREAS, this PA was developed with appropriate public involvement pursuant to 36 CFR 800.2(d) and 800.6(a), and the public was provided the opportunity to comment on the Undertaking and the draft PA during the comment period for the Environmental Assessment; and

WHEREAS, FTA, in consultation with the SHPO and other Consulting Parties, in accordance with 36 CFR § 800.4(a)(1), has established the Project’s Area of Potential Effects (APE), which includes 16th Street from Market Street to Broadway and one parcel on each side of the corridor (Attachment 1); and

WHEREAS, FTA, in consultation with the SHPO and other Consulting Parties, and in accordance with 36 CFR §§ 800.4(b) and 800.4(c), has identified 32 historic properties within the APE, where historic property is defined as a property listed on or eligible for listing on the National Register of Historic Places (NRHP), Attachment 1 contains a map book showing the locations of the historic properties within the APE, and Attachment 2 is a summary table of the historic properties within the APE; and

WHEREAS, the Mall, an 80-foot-wide linear transit way and pedestrian/commercial corridor of 12.5 blocks with three distinct zones (asymmetrically aligned end blocks and symmetrically aligned center blocks) was built between 1980 and 1982. The Mall is an NRHP-eligible historic property under Criterion A in the areas of Transportation and Community Planning and Development, under Criterion C as an award-winning landscape design by I.M. Pei & Partners, and under Criteria Consideration G, as exceptionally significant at the state and local level, because of the Mall’s role in shaping downtown Denver and the Mall’s distinctive design by a team of master designers, which is unique in the state; and

WHEREAS, FTA, in consultation with the SHPO and other Consulting Parties, has identified the following character-defining features of the Mall transit way historic property: consistent paving pattern design; granite paver units/modules that are square (1-foot-5-inch by 1-foot-5-inch), in three shades: charcoal gray, light gray, and “Colorado red” (specified as White, Black, and Red on the 1980 plans); granite special units of charcoal and light gray for curbs, cuts, drains, and other applications;
red oak and honey locust trees planted in specially designed under-pavement concrete root boxes and
ingringed at the surface with custom-designed grates; custom-designed and -built light standards; street
furniture of custom-designed and custom-built fiberglass trash and flower receptacles; and custom
metal street signs on traffic signals and overhead lights; and

WHEREAS, FTA, in consultation with the SHPO, has determined the Undertaking will have an
Adverse Effect on the Mall historic property from known effects to character-defining features,
including shifts in the historic alignment, removal of existing granite pavers and replacing with new
granite pavers, removal of original street furniture and some fixtures, removal and replacement of
existing trees, shifts in some tree locations, removal of the specifically designed tree boxes, a change
in the number and kinds of tree species, and introduction of an additional row of trees on the
asymmetrical end blocks, increasing the overall number of trees; and

WHEREAS, the FTA, in consultation with the SHPO, has determined the Undertaking would result
in No Adverse Effect on 30 of the remaining historic properties and No Historic Properties Affected
on 1 remaining historic property in the APE, and SHPO concurred with this effect finding on June 29,
2018; and

WHEREAS, in accordance with 36 CFR § 800.6(a)(1), FTA notified the Advisory Council on
Historic Preservation (ACHP) on July 5, 2018, of the finding of adverse effect for the Undertaking
with specified documentation, and ACHP responded on July 31, 2018, agreeing to participate in the
consultation pursuant to 36 CFR § 800.6(a)(1)(iii); and

WHEREAS, for the purpose of this PA, “Signatories” are defined as the above-identified Signatories
(FTA, SHPO and ACHP) and includes the Invited Signatories (RTD, CCD and DDP); and

WHEREAS, FTA, in consultation with the SHPO and ACHP, has determined that the development of
this PA in accordance with 36 CFR 800.14(b)(1)(ii) is warranted because effects on the Mall’s
c character-defining features will require further consultation as the design of the Undertaking moves
forward; and

NOW, THEREFORE, FTA, the SHPO, ACHP, RTD, CCD and DDP will ensure that the
following Stipulations are implemented in order to take into account the effect of the Undertaking
on historic properties, and that these Stipulations will govern the Undertaking and all of its parts.

STIPULATIONS

FTA will ensure that the stipulations of this PA are carried out and will require, as a condition of any
approval of federal funding for the Undertaking, adherence to the stipulations set forth herein.

I. DESIGN COMMITMENTS

A. FTA, RTD, and CCD commit to include the following elements in the Project design of
the Mall between Market Street and Broadway as shown in the drawings in Attachment 3:

1. Paving Pattern
   a. Retain a granite paver surface in the same three colors of granite pavers as
      the current design.
   b. Maintain overall design concept of a carpet covering the 80-foot-wide
      Mall property by retaining the pattern.
   c. Retain the geometric and spatial relationships within the design.
   d. Retain the 45-degree diagonal grid pattern in the design.
e. Retain the small, medium, and large diamond patterns in the same (or approximately the same) spatial relationship as the original design.

f. Maintain spatial relationship between trees and light standards.

2. Light Standards
   a. Reuse existing replicated light standards.
   b. Replicate new light standards (on narrow side of asymmetrical blocks) per the specifications shown in Attachment 3.
   c. Light levels may be adjusted.

3. Trees
   a. Place one single row of aligned trees for 12 blocks between Market Street and Cleveland Place as shown in Attachment 3.
   b. Maintain alternating trees and light standards within rows.

4. Transit way
   a. Retain two-way transit service along the Mall.
   b. Retain the existing locations of symmetrical to asymmetrical alignment shifts in the transit way cross-sections, which occur at Arapahoe Street (to Market Street) and Tremont Street (to Broadway), in keeping with the beginning, middle, and end in the original design.
   c. Close the 22-foot medians on symmetrical blocks and 6-foot medians on asymmetrical blocks to remove median areas between the transit lanes (and reallocate the space from the median to provide safe and comfortable public and pedestrian uses) as shown in Attachment 3 drawings.

5. Signage
   a. Retain extant custom metal street name signs at intersections and overhead traffic signals.

6. 16th Street: Cleveland Place to Broadway (triangle block)
   Rebuild the eastern half-block of the Mall between Cleveland Place and Broadway in its historic configuration. The reconstruction will include the following elements:
   a. Maintain the transit way alignment in current location.
   b. Maintain 6-foot median with light fixtures between transit way lanes.
   c. Replace granite pavers in existing pattern and location as shown in Attachment 3.
   d. Rebuild granite curb at the edges of transit way with existing materials and profile as shown in Attachment 3.
   e. Maintain replicated light standards in existing locations as shown in Attachment 3.
   f. Provide trees in the locations specified in the original design. Replace trees and add new species in locations where trees were removed.
   g. The repair and reconfiguration of the fountain on the north side of the plaza will be reviewed separately as part of the design review under Stipulation II.

B. It is recognized that Attachment 3 provides a design concept that will be refined as the design progresses and that other constraints, such as Americans with Disabilities Act (ADA) compliance, unforeseen site conditions, identification of underground hazards or conflicts, drainage and/or maintenance needs, and/or public safety concerns may
necessitate changes to the commitments outlined in Stipulation I.A and the matters addressed in Stipulation II.

C. To help ensure compliance with the design commitments in Stipulation I.A, the Signatories and Concurring Parties to this PA will have an opportunity to review and consult on design plans at 30, 60, and 90 percent completion for the representation of character-defining features of the Undertaking included in Attachment 3. This consultation will occur together with, and follow the process for, the design review process outlined in Stipulation II.B below.

II. DESIGN REVIEW AND CONSULTATION

A. CCD, in coordination with FTA and RTD, will provide the other Signatories and Concurring Parties the opportunity to review and provide ongoing consultation on all design elements affecting the character-defining features of the Mall that are not defined in Stipulation I according to the process described in Stipulation II.B below.

B. The design consultation process, with respect to the items described in Stipulation I and Stipulation II, will proceed as follows: CCD will submit the 30, 60, and 90 percent design development plans to Signatories and Concurring Parties for review and comment.
   1. At each design stage, Signatories and Concurring Parties will be provided advance notice of the upcoming available plans by email at least one week before the plans are made available for review;
   2. For each design review, Signatories and Concurring Parties will have 15 calendar days from receipt of a printed copy of the materials to provide written comments to CCD.
   3. Signatories and Concurring Parties may request a meeting with CCD, RTD, and FTA to discuss their comments.
   4. For each design review, CCD will provide an explanation of how the comments were evaluated and to what extent they can be incorporated into the design to the Concurring Parties within 15 calendar days after receiving the comments.

C. The following are excluded from design review:
   1. Sub-base design, including underground safety related elements, underground utilities; underground infrastructure, including drainage and electrical conduit; and underground tree boxes;
   2. Vehicular and pedestrian traffic signals, visual and tactile aids for bus drivers, and safety-related or bus stop signage.
   3. Tree species selection beyond the location of trees as specified in Stipulation I: Consultation regarding preferred tree species and the agreed-upon intent to replicate the features of the original tree design plan occurred during earlier consultation. The parties recognize that the final tree species selection will be made through a process led by qualified horticulturists in the interest of long-term viability of tree species on the Mall, while attempting to be consistent with the original tree design. The location of trees has been defined in the conceptual design plans included in Attachment 3 and referenced in Stipulation I.A.3.
III. HISTORIC PROPERTIES ENHANCEMENT PROGRAM

A. Historic Property Façade Enhancement Program

1. CCD will assist DDP in establishing a program to enhance historic building façades along the 16th Street Mall, through the funding of grants for lighting and/or façade improvements such as restoration. Grants will require equivalent matching contributions from property owners or occupants.

2. If and when a program is established, CCD will contribute $450,000 to funding the program by separate agreement, which is inclusive of administration and grant costs.

3. CCD will assist DDP in exploring options for agency or agencies to administer the program and CCD will assist DDP in creating the organizational documents for the program. DDP will be the fiscal agent and market the program to Mall property owners.

4. If a lighting program is established:
   a. The program will be generally based on the DDP Lighting Study for 16th Street Denver Mall – Concept Design Report published May 24, 2013.
   b. The program will require updates to the Landmark Preservation Commission (LPC) Design Guidelines for Denver Landmark Structures and Districts, published January 27, 2016. CCD and DDP will coordinate with LPC, following the appropriate process for design guideline changes.

5. Work under the program shall commence once construction of the Project is complete.

6. The program will last up to three years, after which time any remaining funds will be reallocated as provided under the terms of the governing documents for the program.

IV. CONSTRUCTION COMMITMENTS

A. Protection of Historic Properties During Construction

CCD will provide and fund a third-party contractor to monitor construction-related vibration. CCD will ensure that the contractor:

1. Establishes a baseline vibration threshold that takes into account any specific tolerances or sensitivities of the historic properties adjacent to the Mall;

2. Measures vibration levels during construction;

3. Alerts the construction contractor and CCD, if vibration reaches or exceeds the baseline vibration threshold;

4. If the baseline vibration threshold is continually broken, CCD will require its contractor to choose another construction method, if practical and feasible;

5. If no another construction method is practical and feasible, CCD will require its contractor to work with the property owner(s) of the affected historic property(s) to ensure the property is properly monitored during construction and that no damage occurs; and

6. CCD will provide reports and other applicable documentation from Stipulations IV.A.2 – IV.A.5 annually to FTA and the SHPO.

B. Access to Historic Properties During Construction

CCD, in coordination with property and business owners, shall ensure reasonable access to historic properties in the APE during construction. CCD, in coordination with RTD, CCD’s construction contractor, and business owners will implement the Project Management Plan developed in advance of Project construction consistent with the environmental mitigation commitments in accordance with NEPA and the construction contract documents for the Project.
1. This Plan will establish access to properties adjacent to the Mall, as much as practicable.
2. CCD will take steps to ensure that its construction contractor adheres to the Project Management Plan and to CCD ordinances and standards for maintaining access to historic properties during construction.

V. NATIONAL REGISTER OF HISTORIC PLACES EVALUATION
A. After construction of the Project is complete, RTD will prepare an updated Colorado Office of Archaeology and Historic Preservation Form 1403 for the Mall, recording the changes to the property from the Project and including assessment of post-Project NRHP eligibility status.
B. FTA and RTD will submit the completed form to Signatories and Concurring Parties for review and comment.
C. Signatories and Concurring Parties will be provided 30 days to provide comments to RTD.
D. FTA and RTD will respond to comments within 30 days of receipt of comments.

VI. UPDATE MALL MAINTENANCE GUIDELINES
A. CCD, in coordination with RTD and DDP, will develop new or update existing policies, plans, manuals, and/or guidelines for maintenance of the Mall to ensure the condition of the rebuilt Mall is maintained long-term.
B. These new or updated policies, plans, manuals, and/or guidelines will include instructions for maintaining the design commitments in Stipulations I and II.
C. CCD will complete the appropriate plans, manuals, or guidance within one year of the completion of the Project construction.
D. CCD will provide Signatories and Concurring Parties with the opportunity to review and comment on the new or updated policies, plans, manuals, and/or guidelines related to maintenance of elements that convey the Mall’s historic significance, as defined in the revised Form 1403 per Stipulation V above. CCD will consider input from the Signatories and Concurring Parties when finalizing the new or updated policies, plans, manuals, and/or guidelines.

VII. DURATION
This PA will be null and void if its terms are not carried out within ten (10) years from the date of its execution. Prior to such time, FTA may consult with the other Signatories to reconsider the terms of the PA and amend it in accordance with Stipulation XIII below.

VIII. POST-REVIEW DISCOVERIES
See the Unanticipated Discoveries Plan (UDP) in Attachment 4 for more detailed information regarding the following steps and procedures.
A. Inadvertent Discovery of Cultural Resources
   1. If, during Project implementation, CCD uncovers any unanticipated, previously unidentified historic archaeological, or paleontological materials, CCD will proceed in accordance with the procedures outlined in the UDP in Attachment 4 and notify FTA and other Signatories. CCD will not proceed with construction within 30 feet of the discovery until the requirements of 36 CFR 800.13 have been satisfied.
   2. Cultural resources include remains of prehistoric or historic structures, prehistoric or historic artifacts, and plant or animal bones and fossils.
B. Human Remains

1. In the event of the discovery of any human remains, funerary objects, sacred objects, or objects of cultural patrimony, as defined in 43 CFR § 10.2(d), CCD will stop work within 50 feet of the discovery until a qualified archaeologist can examine the resources and assess their significance. CCD will follow the procedures outlined in Colorado Revised Statutes (CRS) 24-80-1301 to 1304, Unmarked Human Graves.

2. Construction will not resume in the location of the discovery until the requirements of CRS 24-80-1302 are met.

IX. PROFESSIONAL QUALIFICATIONS

RTD and CCD shall ensure that all historic preservation and archaeological activities carried out pursuant to this PA shall be accomplished by or under the direct supervision of a person or persons who meet(s) or exceed(s) the pertinent qualifications in the Secretary of the Interior’s Professional Qualification Standards (48 Federal Register [FR] §§44738-44739) in those areas in which the qualifications are applicable for the specific work performed.

X. MONITORING AND REPORTING

Each year following the execution of this PA until it expires or is terminated, RTD and CCD shall provide the other Signatories and Concurring Parties a Summary Report detailing work undertaken pursuant to its terms. Such report shall include any material Project problems encountered, reports from Stipulation IV.A., and any disputes and objections received by FTA during efforts to carry out the terms of this PA.

XI. DISPUTE RESOLUTION

Should any Signatory to this PA object at any time to any actions proposed by another Signatory or Concurring Parties or the manner by which the terms of this PA are implemented, such party shall consult with FTA to resolve the objection. If FTA determines that such objection cannot be resolved, FTA will:

A. Forward all documentation relevant to the dispute, including the FTA’s proposed resolution, to the ACHP. ACHP shall provide FTA with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation. Prior to reaching a final decision on the dispute, FTA shall prepare a written response that considers any timely advice or comments regarding the dispute from ACHP, Signatories and Concurring Parties and provide the applicable party with a copy of this written response. FTA will then proceed according to the FTA’s final decision.

B. If the ACHP does not provide its advice regarding the dispute within thirty (30) days, FTA may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, FTA shall prepare a written response that considers any timely comments regarding the dispute from the Signatories and Concurring Parties and provide the applicable party and ACHP with a copy of such written response.

C. FTA’s responsibility to comply with the terms of this PA that are not the subject of the dispute remain unchanged.

XII. AMENDMENTS

This PA may be amended by an amendment executed by all Signatories. The amendment will be effective on the date a fully executed copy is filed with the ACHP.

XIII. TERMINATION

If any Signatory to this PA determines that such Signatory cannot comply with the terms hereof, such Signatory shall immediately consult with the other Signatories to amend this PA.
per Stipulation XIII, above. If the Signatories do not amend the PA within thirty (30) days (or another time period agreed to by all Signatories), any Signatory may terminate the PA upon written notification to the other Signatories.

Once the PA is terminated, and prior to continuing work on the Undertaking, FTA must either (a) execute a new PA or MOA pursuant to 36 CFR § 800.6 or (b) request, consider and respond to the comments of the ACHP under 36 CFR § 800.7. FTA shall notify the Signatories as to the course of action it will pursue.

EXECUTION of this PA by FTA, ACHP, SHPO, RTD, DDP, and CCD, the submission of documentation and filing of this PA with the ACHP pursuant to 36 CFR § 800.6(b)(1)(iv) prior to FTA’s approval of the Undertaking, and implementation of the terms of this PA provide evidence that FTA has taken into account the effects of this Undertaking on historic properties and afforded the ACHP an opportunity to comment.
PROGRAMMATIC AGREEMENT
AMONG
THE FEDERAL TRANSIT ADMINISTRATION,
THE COLORADO STATE HISTORIC PRESERVATION OFFICER,
AND
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING
IMPROVEMENTS TO THE 16TH STREET MALL
CITY AND COUNTY OF DENVER, COLORADO

SIGNATORIES:

Federal Transit Administration

_________________________________________ Date
Cindy Terwilliger, Regional Administrator

Advisory Council on Historic Preservation

_________________________________________ Date
John M. Fowler, Executive Director

Colorado State Historic Preservation Officer

_________________________________________ Date
Steve Turner, AIA, State Historic Preservation Officer
PROGRAMMATIC AGREEMENT
AMONG
THE FEDERAL TRANSIT ADMINISTRATION, THE COLORADO STATE HISTORIC PRESERVATION OFFICER, AND THE ADVISORY COUNCIL ON HISTORIC PRESERVATION REGARDING IMPROVEMENTS TO THE 16TH STREET MALL CITY AND COUNTY OF DENVER, COLORADO

INVITED SIGNATORIES:

City and County of Denver

[insert name and title]

Regional Transportation District

[insert name and title]

Downtown Denver Partnership

[insert name and title]
PROGRAMMATIC AGREEMENT
AMONG
THE FEDERAL TRANSIT ADMINISTRATION,
THE COLORADO STATE HISTORIC PRESERVATION OFFICER,
AND
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING
IMPROVEMENTS TO THE 16TH STREET MALL
CITY AND COUNTY OF DENVER, COLORADO

CONCURRING PARTIES:

Historic Denver

[insert name and title] Date

Landmark Preservation Commission

[insert name and title] Date

Colorado Preservation, Inc.

[insert name and title] Date

National Trust for Historic Preservation

[insert name and title] Date

Lower Downtown Design Review Board

[insert name and title] Date
ATTACHMENT 1
Area of Potential Effects and Locations of Historic Properties
ATTACHMENT 2
Summary of Historic Properties within the Area of Potential Effects
## ATTACHMENT 2

### TABLE OF IDENTIFIED HISTORIC PROPERTIES WITHIN THE AREA OF POTENTIAL EFFECTS

<table>
<thead>
<tr>
<th>Site ID</th>
<th>Site Name</th>
<th>Address</th>
<th>NRHP Eligibility Status</th>
<th>Finding of Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>5DV.118</td>
<td>Daniels &amp; Fisher Tower</td>
<td>1101 16th Street; 1601 Arapahoe Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.135</td>
<td>Denver Dry Goods Company Building</td>
<td>702 16th Street; California Street; and 16th Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.136</td>
<td>Masonic Temple Building</td>
<td>1614 Welton Street, 535 16th Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.139</td>
<td>Kittredge Building</td>
<td>511 16th Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.142</td>
<td>A.C. Foster Building; University Building</td>
<td>910-918 16th Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.1725</td>
<td>Independence Plaza Prudential Plaza</td>
<td>1001 16th St. 1050 17th St.</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.1760</td>
<td>Bridgepoint Plaza; Park Central</td>
<td>1110 16th Street; 1515 Arapahoe Street; 1111 15th Street</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.1832</td>
<td>Security Life Building; 1600 Glenarm Place</td>
<td>1616 Glenarm Place</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.1854</td>
<td>Hilton Hotel; Radisson Hotel; Adams Mark Hotel</td>
<td>1550 Court Place</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.1856</td>
<td>Dome Tower; Great West Plaza; World Trade Center</td>
<td>1625 Broadway</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.1877</td>
<td>Zeckendorf Plaza; May D &amp; F Plaza; Hyperbolic Paraboloid</td>
<td>350 16th Street; 1550 Court Place</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.1878</td>
<td>Colorado Federal Savings</td>
<td>200 16th Street</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.1880</td>
<td>Petroleum Club Building; Petroleum Building; 110 Building</td>
<td>110 16th Street</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>Site ID</td>
<td>Site Name</td>
<td>Address</td>
<td>NRHP Eligibility Status</td>
<td>Finding of Effect</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------------------------------------------------------------</td>
<td>--------------------------</td>
<td>-------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>5DV.1913</td>
<td>Joslin Dry Goods Company Building; Tritch Building; Savoy Grille</td>
<td>934-938 16th Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.1914</td>
<td>Federal Reserve</td>
<td>1020 16th Street</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.47</td>
<td>Lower Downtown Denver Historic District</td>
<td>Multiple</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.47.15</td>
<td>Waters Building - Market Center</td>
<td>1642 - 1644 Market Street</td>
<td>Contributes to Lower Downtown Historic District</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.47.37</td>
<td>Hitchings Block</td>
<td>1620 Market Street</td>
<td>Contributes to Lower Downtown Historic District</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.47.7</td>
<td>Liebhardt-Linder Building - Market Center</td>
<td>1624 Market Street</td>
<td>Contributes to Lower Downtown Historic District</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.47.96</td>
<td>McCrary Block - Market Center</td>
<td>1628 Market Street</td>
<td>Contributes to Lower Downtown Historic District</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.493</td>
<td>Symes Building; F.W. Woolworth Company</td>
<td>820 16th Street</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.494</td>
<td>A.T. Lewis and Son Department Store; Holtzman and Appel Block</td>
<td>800-816 16th Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.496</td>
<td>Neusteter Building</td>
<td>720-726 16th Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.497</td>
<td>Hayden, Dickinson &amp; Feldhauser Building; Colorado Building</td>
<td>1609-1615 California Street</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.499</td>
<td>McClintock Building</td>
<td>1554 California Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>Site ID</td>
<td>Site Name</td>
<td>Address</td>
<td>NRHP Eligibility Status</td>
<td>Finding of Effect</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------------------</td>
<td>-----------------</td>
<td>-------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>5DV.500</td>
<td>Steel Building; Fontius Building; Sage Building</td>
<td>1555 Welton; 600 16th Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.5297</td>
<td>Liebhardt Building; Cottrell Clothing Company</td>
<td>601 16th Street</td>
<td>Listed on NRHP</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.5298</td>
<td>Walgreens</td>
<td>801 16th Street</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.7044</td>
<td>16th Street Mall</td>
<td>1-1300 16th Street</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.8274</td>
<td>Skyline Park</td>
<td>1500-1800 Arapahoe Street</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5DV.842</td>
<td>16th Street Historic District</td>
<td>Multiple</td>
<td>NRHP-eligible</td>
<td>No Adverse Effect</td>
</tr>
<tr>
<td>5.DV.9217.1</td>
<td>Denver Tramway Trolley Lines archeological site</td>
<td>Broadway</td>
<td>NRHP-eligible</td>
<td>No Historic Property Affected</td>
</tr>
</tbody>
</table>
ATTACHMENT 3
Design Drawings
LPA Plan and Typical Section

Legend:
- Transit Way
- Amenity Zone
- Pedestrian Walkway
- Plaza/Gathering Area
Existing and LPA Symmetrical Block Pattern

Legend

- Historic Replica Light Standard
- Granite Paver Unit - Diamond (colors vary)
- Granite Special Unit - Abutting Curbs/Drains (colors vary)
- Granite Special Unit - Transit Way Delineation (colors vary)
Existing and LPA Asymmetrical Block Pattern

Existing Asymmetrical

LPA New Asymmetrical

Legend

- Historic Replica Light Standard
- Granite Paver Unit - Diamond (colors vary)
- Granite Special Unit - Abutting Curbs/Drains (colors vary)
- Granite Special Unit - Transit Way Delineation (colors vary)
### Shade Trees

<table>
<thead>
<tr>
<th>ID</th>
<th>Family</th>
<th>Botanical Name</th>
<th>Acceptable Cultivar</th>
<th>Common Name</th>
<th>Hardiness Zone</th>
<th>Moisture Level</th>
<th>Soil Salt Tolerance</th>
<th>Aerocid Soil Tolerance</th>
<th>Water Quality Area</th>
<th>Height at Maturity</th>
<th>Canopy Spread at Maturity</th>
<th>Growth Form/Shape</th>
<th>Flowers</th>
<th>Leaf Color – Spring</th>
<th>Leaf Color – Fall</th>
<th>Subject to Change*</th>
<th>Additional Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Fagaceae</td>
<td>Quercus macrocarpa</td>
<td>--</td>
<td>JIS K15/4</td>
<td>Xeric to Min</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>50</td>
<td>40</td>
<td>Broad oval</td>
<td>Insufficient</td>
<td>Dark green</td>
<td>Yellow</td>
<td>No</td>
<td>Bark displays more cork-like features than parent species.</td>
<td></td>
</tr>
<tr>
<td>130</td>
<td>Fagaceae</td>
<td>Quercus rubra/lbergii</td>
<td>--</td>
<td>Chinkapin Oak</td>
<td>Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>No</td>
<td>50</td>
<td>40</td>
<td>Upright oval to rounded</td>
<td>Insufficient</td>
<td>Yellow-green</td>
<td>Yellow</td>
<td>Yes</td>
<td>Tolerant of alkaline soils. Transplant in spring for best survival. Prune to develop central leader.</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Ulmaceae</td>
<td>Celtis laevigata</td>
<td>All Seasons, Magnifica</td>
<td>Sugar Hickory</td>
<td>Xeric to Min</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>50</td>
<td>40</td>
<td>Rounded vase to broad oval</td>
<td>Green in spring, Insufficient</td>
<td>Dark green</td>
<td>Yellow</td>
<td>No</td>
<td>Varieties are more hardy than parent species. Magnifica has similar growth habit to elm and improved insect resistance.</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>Ulmaceae</td>
<td>Celtis occidentalis</td>
<td>Chicagostrip, Common Hickory</td>
<td>3</td>
<td>Xeric to Min</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>50</td>
<td>35</td>
<td>Rounded vase, strong central leader</td>
<td>Green in spring, Insufficient</td>
<td>Dark green</td>
<td>Yellow</td>
<td>Yes</td>
<td>Tolerant of urban growing conditions. Nipple gall may be an esthetic issue. Initiation of mechanical damage. Transplanted in spring (B&amp;B).</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Ulmaceae</td>
<td>Ulmus americana</td>
<td>Princeton</td>
<td>Princeton American Elm</td>
<td>4</td>
<td>Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>50</td>
<td>45</td>
<td>Upright vase</td>
<td>Insufficient</td>
<td>Dark green</td>
<td>Yellow</td>
<td>Yes</td>
<td>Fast growth rate. Highly resistant to Dutch elm disease. Per CSU elm trials, tree may be susceptible to scale. Prune to develop strong branching structure.</td>
</tr>
<tr>
<td>10</td>
<td>Ulmaceae</td>
<td>Ulmus (holmziei x parella Akmel) x carpeliness gable</td>
<td>Patriotic, Patriot Elm</td>
<td>4</td>
<td>Mod</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Yes</td>
<td>45</td>
<td>35</td>
<td>Upright, narrow vase</td>
<td>Insufficient</td>
<td>Dark green</td>
<td>Yellow</td>
<td>No</td>
<td>Resistance to Dutch elm disease. Highly susceptible to elm leaf beetle. Per CSU elm trials, tree may be moderately resistant to scale. Prune to develop strong branching structure.</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Ulmaceae</td>
<td>Ulmus globosa</td>
<td>Pioneer</td>
<td>Pioneer Elm</td>
<td>4</td>
<td>Mod</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Yes</td>
<td>50</td>
<td>45</td>
<td>Rounded vase</td>
<td>Insufficient</td>
<td>Dark green</td>
<td>Yellow</td>
<td>Yes</td>
<td>Cold hardy. Excellent resistance to Dutch elm disease. Resistance to elm leaf beetle. Per CSU elm trials, tree may be susceptible to scale. Prune to develop strong branching structure.</td>
</tr>
<tr>
<td>23</td>
<td>Ulmaceae</td>
<td>Ulmus pumila x japonica x wilsonii</td>
<td>Morton Glossy</td>
<td>Triumph Elm</td>
<td>4</td>
<td>Min to mod</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Yes</td>
<td>50</td>
<td>40</td>
<td>Upright oval to vase</td>
<td>Insufficient</td>
<td>Dark green</td>
<td>Yellow</td>
<td>No</td>
<td>Cold hardy. Resistant to Dutch elm disease and elm leaf beetle. Per CSU elm trials, tree shows high scale rust. Prune to develop strong branching structure.</td>
</tr>
<tr>
<td>24</td>
<td>Ulmaceae</td>
<td>Ulmus japonica x wilsonii</td>
<td>Morton</td>
<td>Acradel Elm</td>
<td>4</td>
<td>Min to mod</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Yes</td>
<td>50</td>
<td>40</td>
<td>Vase with arching limbs</td>
<td>Insufficient</td>
<td>Dark green</td>
<td>Yellow</td>
<td>Yes</td>
<td>Cold hardy. Resistant to Dutch elm disease and elm leaf beetle. Per CSU elm trials, tree shows high scale resistance. Prune to develop strong branching structure.</td>
</tr>
<tr>
<td>92</td>
<td>Ulmaceae</td>
<td>Ulmus davidiana var japonica</td>
<td>Discovery, Discovery Elm</td>
<td>3</td>
<td>Mod</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>No</td>
<td>50</td>
<td>30</td>
<td>Upright oval to arching vase</td>
<td>Insufficient</td>
<td>Dark green</td>
<td>Yellow</td>
<td>Yes</td>
<td>Fast growth rate. Highly resistant to Dutch elm disease. Susceptible to elm leaf beetle. Per CSU elm trials, tree may be moderately resistant to scale. Prune to develop strong branching structure.</td>
<td></td>
</tr>
<tr>
<td>91</td>
<td>Ulmaceae</td>
<td>Ulmus pumila x hollandica x carpellata</td>
<td>Homestead Elm</td>
<td>5</td>
<td>Min to mod</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>No</td>
<td>50</td>
<td>30</td>
<td>Pyramidal oval</td>
<td>Insufficient</td>
<td>Dark green</td>
<td>Yellow</td>
<td>No</td>
<td>Fast growth rate. Highly resistant to Dutch elm disease. Susceptible to elm leaf beetle. Per CSU elm trials, tree may be moderately resistant to scale. Prune to develop strong branching structure.</td>
<td></td>
</tr>
</tbody>
</table>
### Tree Candidates

**Asymmetrical – Red Oak and Similar**

<table>
<thead>
<tr>
<th>ID</th>
<th>Family</th>
<th>Botanical Name</th>
<th>Acceptable Cultivar</th>
<th>Common Name</th>
<th>Hardiness Zone</th>
<th>Moisture Level</th>
<th>Soil Salt Tolerance</th>
<th>Aerosol Salt Tolerance</th>
<th>Water Quality Area</th>
<th>Height at Maturity</th>
<th>Canopy Spread at Maturity</th>
<th>Growth Form/Shape</th>
<th>Flowers</th>
<th>Leaf Color – Spring</th>
<th>Leaf Color – Fall</th>
<th>Subject to Change*</th>
<th>Additional Notes (includes compaction/tolerances/restrictions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>85</td>
<td>Aceraceae</td>
<td>Acer buergeranum</td>
<td>Streetwise</td>
<td>Trident Maple</td>
<td>5</td>
<td>Min</td>
<td>Tolerant</td>
<td>Intermediate</td>
<td>No</td>
<td>30</td>
<td>30</td>
<td>Oval to rounded</td>
<td>Small green-yellow in spring, insignificant</td>
<td>Dark green</td>
<td>Orange-red</td>
<td>Yes</td>
<td>Slow growing. No pests or disease problems at this time. Snow and ice damage may be a concern.</td>
</tr>
<tr>
<td>86</td>
<td>Aceraceae</td>
<td>Acer campestre</td>
<td>–</td>
<td>Hedge Maple</td>
<td>5</td>
<td>Min</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>No</td>
<td>30</td>
<td>30</td>
<td>Oval to rounded, dense</td>
<td>Small green-yellow in spring, insignificant</td>
<td>Dark green</td>
<td>Yellow</td>
<td>Yes</td>
<td>Tolerates dry soil. Insolent of soil compaction. Prune to develop strong branching structure and overhead clearance.</td>
</tr>
<tr>
<td>3</td>
<td>Aceraceae</td>
<td>Acer negundo</td>
<td>Morton</td>
<td>State Street Maple</td>
<td>4</td>
<td>Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>45</td>
<td>35</td>
<td>Upright pyramidal to rounded</td>
<td>Small green-yellow in spring, insignificant</td>
<td>Green</td>
<td>Yellow-orange</td>
<td>Yes</td>
<td>Cold hardy and drought tolerant, chlorosis resistant; pest free.</td>
</tr>
<tr>
<td>101</td>
<td>Hippocastanaceae</td>
<td>Aesculus x Bivertoni</td>
<td>–</td>
<td>Prairie Torch Buckeye</td>
<td>3</td>
<td>Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>No</td>
<td>27</td>
<td>27</td>
<td>Slightly weeping, globose</td>
<td>Yellow-green in spring, showy</td>
<td>Dark green</td>
<td>Orange-red</td>
<td>No</td>
<td>Excellent cold hardiness. Resistant to leaf scorch. Insolent of drought.</td>
</tr>
<tr>
<td>100</td>
<td>Hippocastanaceae</td>
<td>Aesculus x ‘Homestead’</td>
<td>–</td>
<td>Homestead Buckeye</td>
<td>4</td>
<td>Mod</td>
<td>Intermediate</td>
<td>Unknown</td>
<td>No</td>
<td>35</td>
<td>22</td>
<td>Broad and round to rounded, low branching</td>
<td>Yellow-red flowers in spring, showy</td>
<td>Dark green</td>
<td>Bright orange</td>
<td>No</td>
<td>Insolent of excess heat and drought. Powdery mildew, leaf scorch, and leaf drop may be issues. Prune to develop overhead clearance.</td>
</tr>
<tr>
<td>62</td>
<td>Rosaceae</td>
<td>Pyrus calleryana</td>
<td>Glin’s Form</td>
<td>Chanticleer Pear</td>
<td>4</td>
<td>Min to Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>30</td>
<td>15</td>
<td>Upright pyramidal</td>
<td>White in spring, showy</td>
<td>Glossy green</td>
<td>Red</td>
<td>Yes</td>
<td>Greater freelight resistance than other cultivars. Overplanting is a concern. Prune to develop strong branching structure.</td>
</tr>
<tr>
<td>118</td>
<td>Fagaceae</td>
<td>Quercus alba</td>
<td>–</td>
<td>White Oak</td>
<td>3</td>
<td>Mod</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>No</td>
<td>60</td>
<td>60</td>
<td>Oval to rounded</td>
<td>Insignificant</td>
<td>Green</td>
<td>Copper-orange</td>
<td>Yes</td>
<td>Relatively slow growing. May be intolerant of alkaline soils. Chlorosis may be an issue.</td>
</tr>
<tr>
<td>115</td>
<td>Fagaceae</td>
<td>Quercus buckleyi</td>
<td>–</td>
<td>Texas Red Oak</td>
<td>5b</td>
<td>Min</td>
<td>Tolerant</td>
<td>Unknown</td>
<td>No</td>
<td>35</td>
<td>35</td>
<td>Broad rounded</td>
<td>Insignificant</td>
<td>Glossy green</td>
<td>Orange-red</td>
<td>No</td>
<td>Native of Texas is closely related to shumard oak. Tolerant of alkaline soils and drought. Check seed source for hardiness and soil tolerance.</td>
</tr>
<tr>
<td>121</td>
<td>Fagaceae</td>
<td>Quercus shumardii</td>
<td>–</td>
<td>Shumard Oak</td>
<td>5</td>
<td>Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>No</td>
<td>60</td>
<td>40</td>
<td>Pyramid to oval</td>
<td>Insignificant</td>
<td>Green</td>
<td>Orange-red</td>
<td>No</td>
<td>Due to large growth range, source as locally as possible for pH, drought, and hardiness tolerance. Large root system requires large tree lawn. Prune to develop central leader.</td>
</tr>
<tr>
<td>96</td>
<td>Fagaceae</td>
<td>Quercus x iburnaudii</td>
<td>Midwest</td>
<td>Prairie Stature Oak</td>
<td>3</td>
<td>Min to Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>No</td>
<td>45</td>
<td>35</td>
<td>Broad pyramidal</td>
<td>Insignificant</td>
<td>Insignificant</td>
<td>Dark green</td>
<td>Yes</td>
<td>Cold hardy, hybrid of English and white oak. Tolerant of alkaline soils.</td>
</tr>
<tr>
<td>120</td>
<td>Ulmaceae</td>
<td>Ulmus davidiana var. japonica</td>
<td>BartOne</td>
<td>Northern Japanese Elm</td>
<td>3</td>
<td>Mod</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>No</td>
<td>28</td>
<td>24</td>
<td>Rounded, open</td>
<td>Insignificant</td>
<td>Green</td>
<td>Red</td>
<td>No</td>
<td>Medium growth rate. Resistant to Dutch elm disease and elm leaf beetle. Resistance to scale unknown. Prune to develop strong branching structure.</td>
</tr>
<tr>
<td>4</td>
<td>Ulmaceae</td>
<td>Ulmus parvifolia</td>
<td>Dynasty</td>
<td>Dynasty Elm</td>
<td>5</td>
<td>Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>35</td>
<td>35</td>
<td>Vase</td>
<td>Insignificant</td>
<td>Green</td>
<td>Yellow-orange</td>
<td>No</td>
<td>Fast growth rate. Resistance to Dutch elm disease, scale, and elm leaf beetle unknown. Prune to develop strong branching structure. Availability may be limited. Unproven in Denver region.</td>
</tr>
<tr>
<td>62</td>
<td>Ulmaceae</td>
<td>Ulmus parvifolia</td>
<td>Erna II</td>
<td>Ashlo Lacebark Elm</td>
<td>5</td>
<td>Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>45</td>
<td>30</td>
<td>Upright vase with arching limbs</td>
<td>Insignificant</td>
<td>Green</td>
<td>Orange-red</td>
<td>Yes</td>
<td>High resistance to Dutch elm disease and elm leaf beetle. Resistance to scale unknown. This, shaley bark. Prune to develop strong branching structure.</td>
</tr>
<tr>
<td>64</td>
<td>Ulmaceae</td>
<td>Ulmus parvifolia</td>
<td>Cortico</td>
<td>Cork Bark Elm</td>
<td>6</td>
<td>Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>40</td>
<td>40</td>
<td>Vase</td>
<td>Insignificant</td>
<td>Dark green</td>
<td>Orange</td>
<td>No</td>
<td>Resistance to Dutch elm disease, scale, and elm leaf beetle unknown. Prune to develop strong branching structure. availability may be limited. Unproven in Denver region.</td>
</tr>
<tr>
<td>5</td>
<td>Ulmaceae</td>
<td>Ulmus serotina</td>
<td>Halka</td>
<td>Balka Zelkova</td>
<td>5b</td>
<td>Xeric to Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>50</td>
<td>35</td>
<td>Upright vase, open &amp; loose form</td>
<td>Insignificant</td>
<td>Green</td>
<td>Yellow-orange</td>
<td>No</td>
<td>Growth rate is fastest of zelkova cultivars. Tolerant of urban conditions. Susceptible to canker from mechanical injury. Plant in spring. Prune in fall to develop strong branching structure.</td>
</tr>
<tr>
<td>65</td>
<td>Ulmaceae</td>
<td>Ulmus serotina</td>
<td>Green Vein</td>
<td>Green Vein Zelkova</td>
<td>5b</td>
<td>Xeric to Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>45</td>
<td>30</td>
<td>Vase, upright arching branches</td>
<td>Insignificant</td>
<td>Green</td>
<td>Orange</td>
<td>No</td>
<td>Plant in spring. Prune in fall to develop strong branching structure.</td>
</tr>
<tr>
<td>2</td>
<td>Ulmaceae</td>
<td>Ulmus serotina</td>
<td>–</td>
<td>Chinese Zelkova</td>
<td>5b</td>
<td>Xeric to Mod</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Yes</td>
<td>35</td>
<td>35</td>
<td>Vase</td>
<td>Insignificant</td>
<td>Dark green</td>
<td>Yellow-orange</td>
<td>No</td>
<td>Resistant to elm leaf beetle. Exfoliating cinnamon-colored bark. Prune in fall to develop strong branching structure. Availability may be limited. Unproven in Denver region.</td>
</tr>
</tbody>
</table>

* Trees are subject to change based on design changes. Department of Forestry recommendations, and availability.

**Note:** The tree species listed are preliminary candidates for future use on the 16th Street Mall, based on design and health/resiliency criteria. Criteria are subject to change based on design changes, Department of Forestry recommendations, and availability.
Unanticipated Discovery Plan for 16th Street Mall
Denver, Denver County, Colorado

December 2018
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<td>1.2 Procedure for Discovery of Human Remains</td>
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<td>2 Federal, State, and Local Agency Information</td>
<td>2-1</td>
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</table>
Acronyms and Abbreviations

ARPA  Archeological Resources Protection Act
CCD  City and County of Denver
CFR  Code of Federal Regulations
CO  Colorado
Council  Advisory Council on Historic Preservation
CRS  Colorado Revised Statutes
DDP  Downtown Denver Partnership
FTA  Federal Transit Administration
LA  Louisiana
MOA  Memorandum of Agreement
NAGPRA  Native American Graves Protection and Repatriation Act
NHPA  National Historic Preservation Act
NPS  National Park Service
NRHP  National Register of Historic Places
Project  Improvements to the 16th Street Mall, Denver, Colorado
QPA  Qualified Professional Archeologist
RTD  Regional Transportation District
SHPO  State Historic Preservation Officer
UDP  Unanticipated Discovery Plan
SECTION 1

Unanticipated Discovery Plan

The Federal Transit Administration (FTA), as the lead federal agency, has determined that the Improvements to the 16th Street Mall (Project) constitute an Undertaking under 36 Code of Federal Regulations (CFR) 800.16(y), which requires compliance with Section 106 of the National Historic Preservation Act (NHPA) (54 United States Code [U.S.C.] § 306108) and its implementing regulations in 36 CFR Part 800.

FTA, in coordination with the Regional Transportation District (RTD) and the City and County of Denver (CCD), proposes to implement improvements to the 16th Street Mall (Mall). The Project proposes to develop and implement a flexible and sustainable design for the Mall to address deteriorating infrastructure, provide equitable and sufficient space for high-quality public gathering opportunities, improve pedestrian and vehicle safety, and continue safe and accessible two-way transit shuttle service on the Mall while honoring the Mall’s use and iconic design through improved drainage, realignment of the 16th Street Mall’s asymmetrical ends, relocation of the transit lanes, conversion of the current median to transit lanes, installation of new street furniture and fixtures, and replacement of the existing granite pavers with new granite pavers;

The FTA is the lead federal agency responsible for the Undertaking and for ensuring that the requirements of Section 106 of the NHPA are fulfilled in accordance with 36 CFR Part 800. Following Section 106 consultation with the Colorado State Historic Preservation Officer (SHPO), identified federally recognized tribes, local consulting parties, and the FTA, it was determined that the Mall is eligible for the National Register of Historic Places (NRHP). The FTA has determined that the Undertaking will result in an adverse effect on the 16th Street Mall historic property.

There is Memorandum of Agreement (MOA) among the FTA, Advisory County on Historic Preservation (Council), and Colorado SHPO to record the resolution measures to resolve the adverse effect to the Mall; the CCD and RTD are Invited Signatories to the MOA. Stipulation IX of the MOA requires that in the event of an unanticipated discovery of cultural resources or historic properties during Project implementation, the CCD will proceed in accordance with the procedures outlined in an Unanticipated Discovery Plan (UDP) and notify the FTA and other signatories. Therefore, this UDP has been developed for use during improvements to the 16th Street Mall.

This UDP will be implemented if new or additional historic properties or cultural resources are encountered during construction, related excavation, or other ongoing activities on the proposed Undertaking. For the purposes of this UDP, cultural resources may include archaeological resources (any site that contains material remains of past human life or activities), historic structures, (any building or structure greater than 50 years of age), linear features (such as a rail line), or other items that possess cultural importance to individuals or a group.

This UDP has been developed through reference to the regulations embodied in the Protection of Historic Properties issued by the Council (revised August 2004, https://www.achp.gov/sites/default/files/regulations/2017-02/regs-rev04.pdf. CH2M HILL
Engineers, Inc. (CH2M), now part of Jacobs Engineering Group, Inc., reviewed Colorado legislation (Colorado Revised Statutes CRS 24-80-401-411 and CRS 24-80-1301-1305, as well as 8 Colorado Code of Regulations 1504-7) that was used in the development of this UDP.

1.1 Procedure when Cultural Materials are Observed

Termed “unanticipated discovery” or “post-review discovery,” the identification of new or additional cultural resources during implementation of an undertaking typically occurs in the case of projects that involve excavation or ground-disturbing activities. The following measures will be implemented if an unanticipated cultural resource discovery is made by CCD, RTD, Downtown Denver Partnership (DDP), FTA, CH2M, any other contractor, or any subcontractor during construction of the proposed Undertaking:

1. Construction activities or related excavation within 30 feet of an unanticipated discovery will be halted and the discovery protected from further disturbance.

2. Within 24 hours of an unanticipated discovery, CCD will notify by telephone the FTA and Colorado SHPO and, in the case of human remains, the Denver County coroner and sheriff.

3. CCD will consult with the FTA and SHPO on the most appropriate course of action for treatment of the unanticipated discovery. This may involve further archaeological study to record, document, or evaluate potential NRHP-eligibility of the inadvertently discovered cultural resources.

4. Specific FTA and SHPO instructions concerning an unanticipated discovery resulting from the notification as previously described will be followed by an Qualified Professional Archaeologist (QPA) or will be under the direct supervision of a person or persons who meet(s) or exceed(s) the pertinent qualifications in the Secretary of the Interior’s Professional Qualification Standards (48 CFR §§44738-44739) in those areas in which the qualifications are applicable for the specific work performed.

5. At a minimum, sufficient archaeological work will be performed on the unanticipated discovery location to stabilize deposits, protect deposits from scavengers or looters, and collect readily available samples (for example, for radiocarbon dating), which may help pinpoint the age of deposits.

6. FTA will also consult with any consulting Indian tribes that may ascribe traditional cultural and religious significance to affected historic properties.

7. If neither the SHPO, consulting parties, nor consulting tribes submit any objection to FTA's plan for addressing the discovery within 48 hours, FTA may carry out the requirements of 36 CFR 800.13, and the Council need only be notified in the event there is an adverse effect.

8. Construction activities will remain halted in the area of the unanticipated discovery until the FTA and SHPO indicate that it may proceed in the area of a specific unanticipated discovery and the requirements of 36 CFR 800.13 have been fulfilled.

1.2 Procedure for Discovery of Human Remains

In the case of an unanticipated discovery of human remains and/or cultural items (such as funerary objects, sacred objects, or objects of cultural patrimony) that are subject to the Native American Graves Protection and Repatriation Act (NAGPRA) (25 U.S.C. § 3001-3013, 18 U.S.C.
§ 1170) and the Archeological Resources Protection Act (ARPA) (16 U.S.C. § 470aa Remains and Funerary/Sacred Objects), the CCD and CH2M propose to follow all relevant state and federal laws and recommendations regarding treatment of human remains as referenced in Section 1.1. The CCD recognizes the importance of providing careful and respectful treatment for human remains recovered as an unanticipated discovery or as part of an archaeological investigation. In the event of an unanticipated discovery of human remains, CCD will consult with the FTA and SHPO as to the appropriate federally recognized tribes or other groups with which to consult. In coordination with the FTA, SHPO, and other interested parties, a decision will be made for the treatment of the remains (for example, reburial, preservation in place, scientific study, sacred ritual, or a combination thereof). Pursuant to CRS 24-80-1302, this protocol includes the following:

1. If human remains are encountered, work in the general area of the discovery will stop immediately and the location will be immediately secured and protected from damage and disturbance. During construction activity, the area is to be marked off with clear evident means, such as flagging or tape.

2. All human remains or associated artifacts will be left in place and not disturbed. No skeletal remains or materials associated with the remains will be collected or removed until appropriate consultation has taken place and a plan of action has been developed.

3. The county coroner and medical examiner, local law enforcement, the FTA, the SHPO, and appropriate Indian tribes will be notified immediately. The coroner will conduct an onsite examination within 48 hours of notification to determine whether skeletal remains are human and the degree of their forensic value. If the coroner is unable to make these determinations, local law enforcement, the FTA, or the coroner may request the forensic anthropologist of the Colorado Bureau of Investigation to assist.

4. If the remains are determined to be human but have no forensic value, the coroner will notify the Colorado State Archaeologist of the discovery, who will in turn recommend security measures for the discovery location.

5. The Colorado State Archaeologist will facilitate the remains to be examined by a QPA who meet(s) or exceed(s) the pertinent qualifications in the Secretary of the Interior’s Professional Qualification Standards (48 CFR §§44738-44739). The QPA will determine if the remains are more than 100 years old, evaluate the integrity of their archaeological context, and complete necessary documentation within a timely manner.

6. If human remains are determined to be Native American, the remains will be left in place and protected from further disturbance until a plan for their avoidance or removal can be generated. The State Archaeologist will notify the Colorado Commission of Indian Affairs (Commission). The FTA will consult with the SHPO, Commission, and federally recognized tribal groups to develop a plan of action that is consistent with the NAGPRA guidance.

7. If human remains are determined to be non-Native American, the remains will be left in place and protected from further disturbance until a plan for their avoidance or removal can be generated in consultation with the National Park Service (NPS), the SHPO and other appropriate parties. Historic research and consultation with local authorities and historic experts will be conducted by a QPA to try to determine the possible identity and affiliation of the remains and determine if there are any lineal descendants who should be consulted.
concerning the treatment of the remains. Notice of the discovery will be published in local media outlets for at least 3 days to assist in identification of lineal descendants.
**Federal, State, and Local Agency Information**

*Table 2-1* identifies the agency representatives to be contacted in case of unanticipated discoveries.

<table>
<thead>
<tr>
<th>Name</th>
<th>Title/Agency</th>
<th>Phone</th>
<th>Address</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Federal Transit Administration</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cindy Terwilliger</td>
<td>Regional Administrator/FTA</td>
<td>303-362-2400</td>
<td>Federal Transit Administration, Byron Rogers Federal Building, 1961 Stout Street, Suite 13-301 Denver, CO 80294</td>
<td></td>
</tr>
<tr>
<td><strong>Colorado State Historic Preservation Officer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steve Turner</td>
<td>State Historic Preservation Officer</td>
<td>303-866-3355</td>
<td>History Colorado 1200 Broadway, Denver, CO 80203</td>
<td><a href="mailto:steve.turner@state.co.us">steve.turner@state.co.us</a></td>
</tr>
<tr>
<td>Holly Norton</td>
<td>State Archaeologist Deputy SHPO</td>
<td>303-866-2736</td>
<td>History Colorado 1200 Broadway, Denver, CO 80203</td>
<td><a href="mailto:holly.norton@state.co.us">holly.norton@state.co.us</a></td>
</tr>
<tr>
<td><strong>Denver County Coroner</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Office of the Medical Examiner</td>
<td>303-866-2736</td>
<td>500 Quivas Street Denver, CO 80204</td>
<td><a href="mailto:medcomments@denvergov.org">medcomments@denvergov.org</a></td>
</tr>
<tr>
<td><strong>Local Law Enforcement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Denver Police Department</td>
<td>720-913-2000</td>
<td>Police Administration Building 1331 Cherokee Street Denver, CO 80204-4507</td>
<td><a href="mailto:dpdpio@denvergov.org">dpdpio@denvergov.org</a></td>
</tr>
<tr>
<td><strong>Colorado Commission of Indian Affairs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ernest House</td>
<td>Executive Director/Colorado Commission of Indian Affairs</td>
<td>303-866-5470</td>
<td>Office of the Lt. Governor 130 State Capitol, Denver CO 80203</td>
<td><a href="mailto:ernest.house@state.co.us">ernest.house@state.co.us</a></td>
</tr>
<tr>
<td><strong>City and County of Denver</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Jacobs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amy C. Favret</td>
<td>Senior Archaeologist/Principal Investigator</td>
<td>513-595-5642</td>
<td>1880 Waycross Road Cincinnati, Ohio 45240</td>
<td><a href="mailto:amy.favret@jacobs.com">amy.favret@jacobs.com</a></td>
</tr>
<tr>
<td>Sara S. Orton</td>
<td>Cultural Resources Specialist</td>
<td>504-810-0017</td>
<td>3330 W. Esplanade Avenue Suite 612 New Orleans, LA 70002</td>
<td><a href="mailto:sara.orton@jacobs.com">sara.orton@jacobs.com</a></td>
</tr>
<tr>
<td><strong>Contractor (TBD)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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