16th Street Mall Alternatives Analysis and Environmental Assessment

Project Partners

Federal Transit Administration
Regional Transportation District
City and County of Denver
Downtown Denver Partnership

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16th Street Mall Alternatives Analysis and Environmental Assessment

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By the
US DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION
and
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Abbreviations and Acronyms

ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
APE	Area of Potential Effect
APM	annual passenger miles
ASTM	ASTM International
BBC	BBC Research and Consulting
BID	Business Improvement District
BMP	best management practice
CBD	Central Business District
CCD	City and County of Denver
CCS	Civic Center Station
CCTV	closed-circuit television
CDPHE	Colorado Department of Public Health and Environment
CFR	*Code of Federal Regulations*
CIL	Certifiable Items List
CO	carbon monoxide
CPTED	Crime Prevention Through Environmental Design
DDP	Downtown Denver Partnership
DOJ	U.S. Department of Justice
DOT	U.S. Department of Transportation
DRCOG	Denver Regional Council of Governments
DURA	Denver Urban Renewal Authority
DUS	Denver Union Station
EA	Environmental Assessment
FHWA	Federal Highway Administration
FOE	Finding of Effect
FTA	Federal Transit Administration
GO	General Obligation
IGA	Intergovernmental Agreement
KOP	key observation point

LPA	Locally Preferred Alternative
LRT	light rail transit
LUST	leaking underground storage tank
MOA	Memorandum of Agreement
MOT	maintenance of traffic
NAAQS	National Ambient Air Quality Standards
NACTO	National Association of Transportation Officials
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIBRS	National Incident-based Reporting System
NO_2	nitrogen dioxide
NO_x	nitrogen oxide
NPS	National Park Service
NRHP	National Register of Historic Places
OAHP	Office of Archaeology and Historic Preservation
PIP	Public Information Plan
$PM_{2.5}$	particulate matter less than or equal to 2.5 micrometers in diameter
PM_{10}	particulate matter less than or equal to 10 micrometers in diameter
PMP	Project Management Plan
RGA	Recovered Government Archives (LUST database)
RTD	Regional Transportation District
S&S	Safety and Security
SHPO	State Historic Preservation Officer
SHWS	State Hazardous Waste Site
TIF	Tax Incremental Financing
TMP	Traffic Mitigation Plan
U.S.C.	United States Code
VOC	volatile organic compound

Executive Summary

Project Overview

Downtown Denver's 16th Street Mall (Mall) is Denver's busiest transit artery and premier public space, one of the longest pedestrian and transit malls in the world and designated as a transit fixed guideway. The Mall was designed in the late 1970s as a transit and pedestrian mall by the renowned architectural firms of 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, resembling a diamondback rattlesnake skin. Today, the transit shuttle bus route along the Mall, known as the Free MallRide, eliminates approximately 870 daily bus trips from Downtown Denver streets, reducing traffic congestion (Marsella, 2008, pers. comm.). The Mall energizes the downtown business environment with a unique pedestrian- and transit-oriented public space.

In recent years, the Free MallRide service has been expanded farther west along 16th Street to the renovated and revitalized Denver Union Station, a transit hub that connects Regional Transportation District's (RTD) Free MallRide passengers to light rail, commuter rail, and local and regional bus connections. 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 as a result of the construction methods that caused failure and deterioration of the materials, as well as the passage of time. Safety improvements and updates, mobility solutions, and efforts to increase public use are also needed. Multiple recommendations and studies to address the Mall's infrastructure, safety, mobility, programming, and use have been put forth over the past decade by the City and County of Denver (CCD), RTD, Downtown Denver Partnership (DDP), and Downtown Denver Business Improvement District (BID), but none of them have resulted in a comprehensive program of improvements.

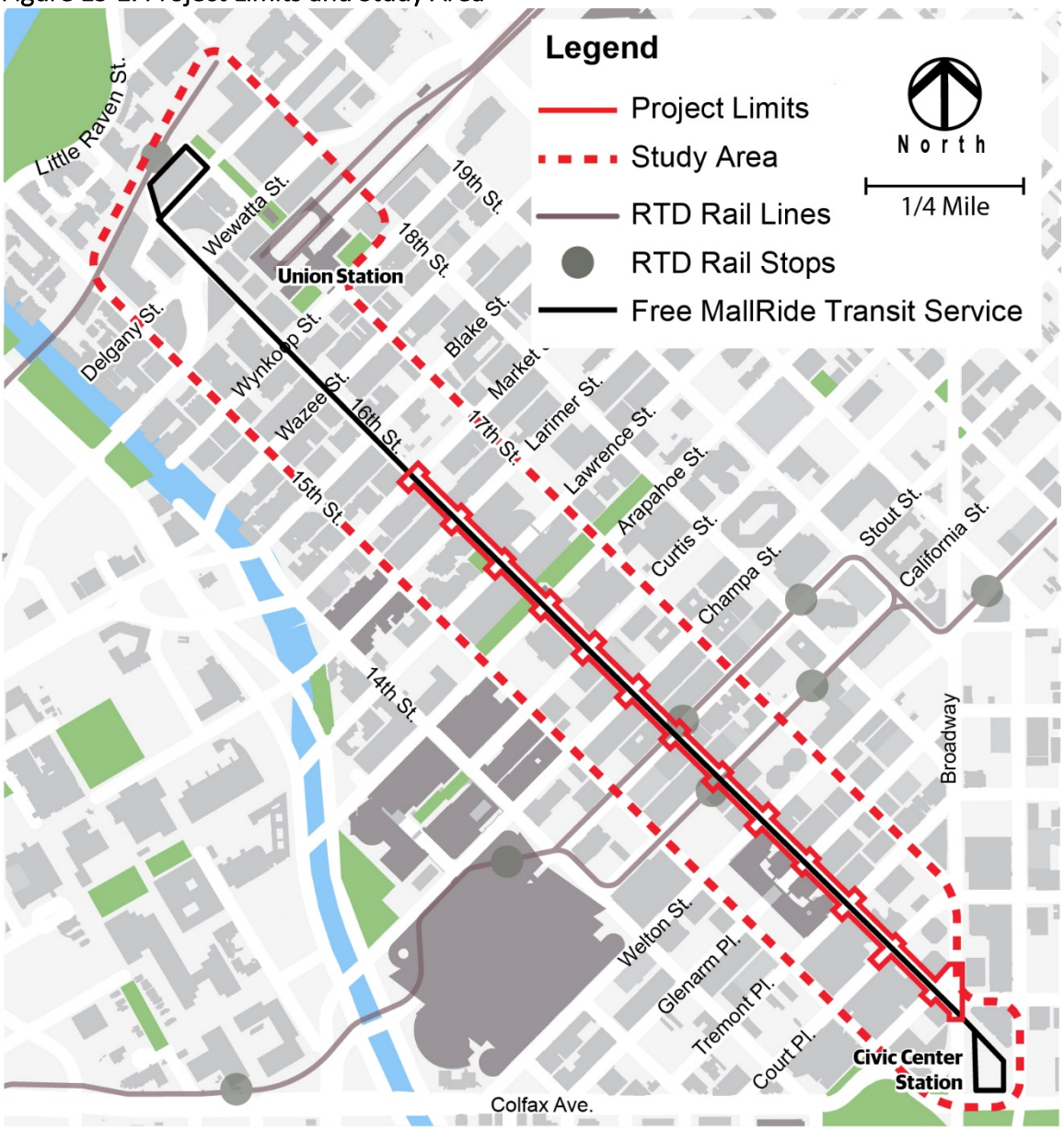
A group of partners comprising RTD, CCD, DDP, and the Federal Transit Administration (FTA) (Project Partners) propose to implement improvements to the Mall to address infrastructure, mobility, safety, and public use needs (Project). The Project will be funded through a combination of Denver Urban Renewal Authority (DURA) Tax Increment Financing (TIF) funds that must be spent on construction by mid-2022; FTA grant funding; and General Obligation (GO) bond funding. The Project limits cover the length of the original 12.5 blocks of the Mall from Market Street to Broadway, the 80-foot width of the Mall, the plaza at Broadway, and portions of cross streets intersecting the Mall (**Figure ES-1**).

Because federal funds are proposed to be contributed to the Project, the Project must comply with the National Environmental Policy Act (NEPA), which requires consideration of the effects the proposed Project will have on social, economic, and natural resources. FTA, in coordination with RTD and the other Project Partners, is preparing this Environmental Assessment (EA) to document the NEPA process and the evaluation of environmental impacts anticipated for the Project in accordance with 23 *Code of Federal Regulations* 771.

Project Purpose and Need

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 on the Mall while honoring the Mall's use and iconic design.

Figure ES-1. Project Limits and Study Area



The following improvements are needed:

- **Address deteriorating infrastructure to allow reasonable maintenance frequency and costs to businesses and taxpayers.** 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 granite pavers during freeze-thaw cycles, and the pavers

eventually break over time. Other elements of the Mall (for example, fountains, tree infrastructure, and electric power supply) are also in need of rehabilitation, modernization, or both.

- **Improve safety for pedestrians and vehicles.** There is no clear visual nor 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. The lack of strong delineation and crowding on the undersized pedestrian walkways, which are too narrow to meet CCD downtown pedestrian walkway standards and carry peak hour pedestrian volumes, contribute to pedestrians walking in and across the transit way, causing potential pedestrian-vehicle conflicts and near-misses. In addition, the finish applied to the pavers has become slippery, creating the potential for 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 to serve 70,000 riders per day by 2035. Frequent maintenance of the failing pavement results in interruptions to Free MallRide transit service. Pedestrian walkways are undersized for peak hour pedestrian traffic, do not meet CCD standard pedestrian walkway widths, and are frequently obstructed by pedestrians gathering at shuttle stops.
- **Increase opportunities for public use of the Mall as an iconic civic space for leisure, commerce, and tourism.** In the median blocks, transit ways currently separate the public realm into three separate zones, limiting space for safe and engaging public use and amenities. A negative perception of safety, along with isolation and lack of natural surveillance of the medians, inhibits positive public use of the Mall in some locations. In the asymmetrical blocks, public amenities such as trees and furniture are only located on the wide side of the block because the narrow side is not wide enough to accommodate additional programming beyond the existing patio/gathering zone and an undersized pedestrian walkway. Adequate and flexible public space is needed to attract more people to the Mall for quality public-gathering activities during standard transit operations and during special events where transit is temporarily detoured and the Mall operates as a public plaza.

Alternatives Considered and Evaluated

The Project Partners developed a range of alternatives comprising physical and operational design elements to address the Mall's problems and needs. The alternatives considered input received from stakeholders and the public during the Project scoping period. Input included the need for improved safety and security on the Mall, wider pedestrian walkways, a less slippery surface, consistency with the iconic design, strong multi-modal connections, frequent Free MallRide shuttle service, and continued programming and events to activate the Mall.

All alternatives 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). Although several design elements were studied that would change transit operations, these design elements were not carried forward into the range of alternatives because they were not

feasible and/or would not address the Project's purpose and needs. Reducing transit service on the Mall or maintaining current service levels and shifting future ridership demand to parallel services (such as bus service on parallel streets or the Free MetroRide) would not meet RTD's service requirements, nor would it accommodate all riders.

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 initially developed and are illustrated on **Figure ES-2**, along with the existing configuration of the Mall (the No Build Alternative) for comparison. These five build alternatives do not include the Locally Preferred Alternative (LPA) Design Option that is evaluated in this EA; the LPA Design Option was developed later in the NEPA process as the LPA was further evaluated and refined.

The initial five build alternatives were designed and selected with the purpose of retaining historic design features while also meeting the purpose and need for the Project. That historic design includes three sections of the Mall, as follows:

- 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-and-a-half asymmetrical blocks on the eastern end of the Mall from Tremont Place to Broadway, in the same configuration as described for the western end of the Mall, with the north side of the half-block between Cleveland Place and Broadway extending into a triangular plaza where the downtown and city street grids converge.

Four of the alternatives would rebuild the Mall to replace the failing infrastructure, while one alternative would partially repair the infrastructure. **Table ES-1** summarizes the key features of each build alternative.

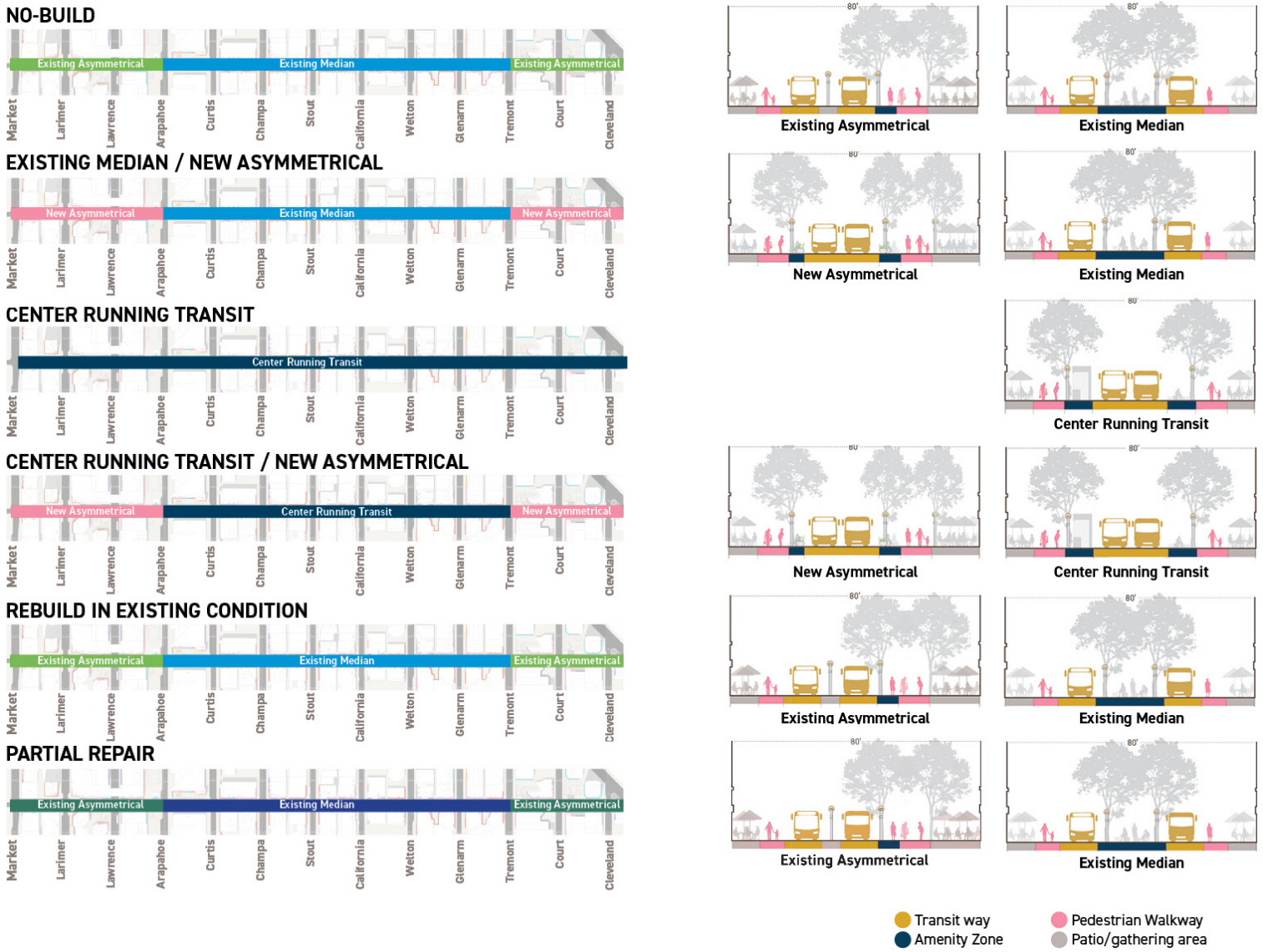
Table ES-1. Range of Alternatives

Alternative	Alignment and Cross-section Design	Infrastructure Improvements and Transit Operations
Median and New Asymmetrical	Median blocks replicate existing median block design and transit way location. New asymmetrical blocks remove the small median with light standards in transit ways and add width to narrow pedestrian walkways. Rebuild half-block plaza at Broadway in existing configuration.	Reconstruct Mall to replace failing pavement system, including a new sub-base that drains properly. Replace underground infrastructure and trees; provide opportunity to upgrade utilities. Comply with federal requirements, including ADA and homeland security standards. Continue operation of Free MallRide at RTD's current and planned levels of service.

Alternative	Alignment and Cross-section Design	Infrastructure Improvements and Transit Operations
Center Running	Transit ways located in center of block with wide pedestrian walkways to each side, for length of Mall.	Same as Median and New Asymmetrical.
Center Running and New Asymmetrical	Median blocks replaced with transit way in center of block with wide pedestrian walkways to each side. New asymmetrical blocks remove small median with light standards in transit way and add width and row of trees to narrow pedestrian walkway. Rebuild half-block plaza at Broadway in existing configuration.	Same as Median and New Asymmetrical.
Rebuild in Existing Configuration	Median, asymmetrical, and plaza blocks replicate existing design and transit way location.	Same as Median and New Asymmetrical.
Partial Repair	Median, asymmetrical, and plaza blocks remain in existing configuration.	Partially repair the infrastructure including renovation of existing granite paver system; retain existing sub-slab below pavers. Replace failing and missing trees. Comply with federal requirements, including ADA and homeland security standards, to the extent possible within the existing Mall configuration. Continue operation of the Free MallRide at RTD's current and planned levels of service.

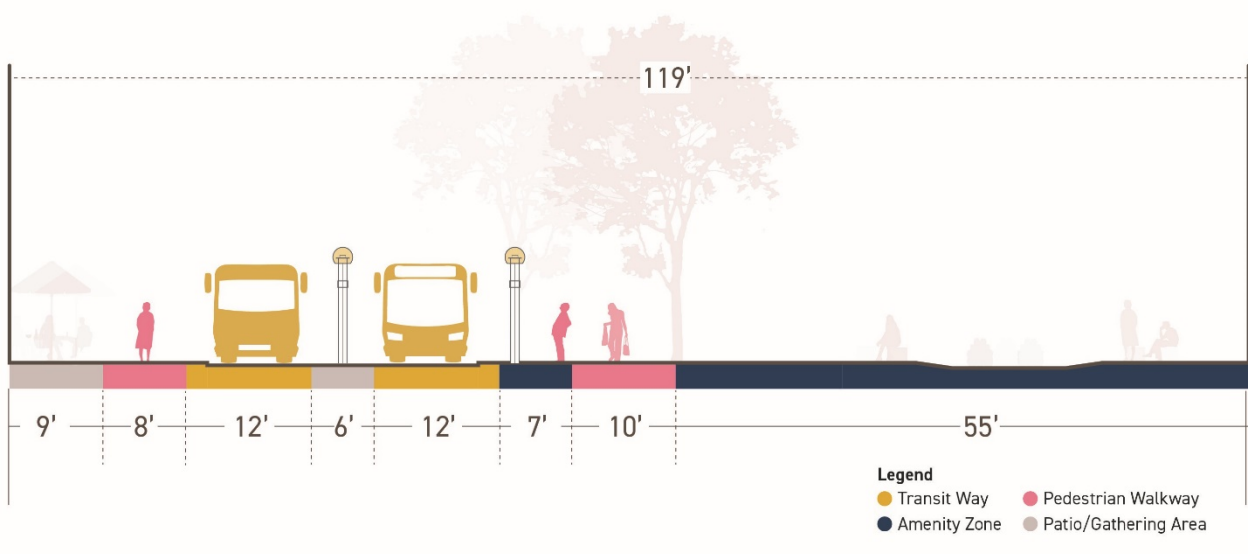
ADA = Americans with Disabilities Act

Figure ES-2. Range of Alternatives Carried Forward



*Note: Under the Existing Median and New Asymmetrical and Center Running Transit and New Asymmetrical alternatives the Gateway Plaza configuration (**Figure ES-3**) could be implemented between Cleveland Place and Broadway.*

Figure ES-3. Gateway Plaza



A two-step screening process (referred to as Level 1 and Level 2 screenings) evaluated the alternatives. Level 1 evaluated the alternatives on criteria related to purpose and need factors, while Level 2 further screened the alternatives on purpose and need factors, costs, and community and environmental impacts. Pavement materials and other design options were evaluated using similar criteria.

The screening evaluation concluded that only two alternatives met the Project purpose and need: the Center Running Alternative, and Center Running and New Asymmetrical Alternative. The Center Running and New Asymmetrical Alternative as it was originally designed did not fully meet the Project purpose and need: on the asymmetrical blocks, there was no amenity zone on one side of the block to provide a buffer between the pedestrian walkway and the transit way; there were fewer trees to encourage public use; and the wider side of the blocks provided much more public space than the narrow side, providing more benefit to property and business owners on the wider side and perpetuating inequitable distribution of public space for adjacent property owners. However, the Center Running and New Asymmetrical Alternative would have less impact on the historic design of the Mall than the Center Running Alternative because it would maintain the configuration of asymmetrical blocks at the ends of the Mall and symmetrical blocks in the middle.

The Center Running and New Asymmetrical Alternative was then refined to better meet the Project purpose and need by further centering the transit way in the asymmetrical blocks to add more public space and a row of trees on the narrow side of the cross-section design. The new row of trees would be in an amenity zone and act as a buffer between the pedestrian walkway and the transit way, improving safety; would align with a row of trees on the center-running blocks, similar to the existing single row of trees aligned for the entire length of the Mall; and would provide trees to encourage public use and more equitably distribute space on both sides of the block. After continued analysis, including continued review of guidance documents, 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.

The refined Center Running and New Asymmetrical Alternative was identified as the LPA.

Design options to the LPA were developed in response to input received during consultation under Section 106 of the National Historic Preservation Act (NHPA). These design options were evaluated using the Level 2 evaluation criteria, and one option was carried forward for impacts evaluation in the EA. The LPA Design Option would modify the LPA asymmetrical block design to eliminate the 2-foot shift in the pavement pattern, trees, and lights on the wide side of the block; reduce the number of asymmetrical blocks; and increase the number of symmetrical blocks. The EA evaluation concludes the LPA Design Option would have greater impacts to social and environmental resources and would not meet the purpose and need as well as the original LPA design, and the LPA Design Option is not included as a component of the Project.

Concurrent with the Level 2 evaluation, the pavement options analysis and input from Section 106 Consultation concluded that granite pavers in a mortar bed would most minimize harm to the Mall as a historic resource. The LPA includes a new pavement system of granite pavers on a new sub-base.

The Level 2 evaluation of transit way edge delineation options concluded that a hybrid curb option, which uses vertical curbs at designated shuttle stops, cross streets, and intersections, and then transitions to a pan for the remainder of each block, better meets the purpose and need compared to vertical curbs or pans for the entire length of each block. The LPA includes the hybrid curb option.

The No Build Alternative represents future conditions that include continued repairs on an as-needed basis, but without the construction and operation of the Project. The No Build Alternative does not meet the purpose and need for the Project, as it would not replace failing and outdated infrastructure; provide safer delineation between pedestrian walkways and the transit way; address the slippery finish of the pavers; reduce the frequency of maintenance impacts to transit operations; expand undersized pedestrian walkways; nor improve the spatial configuration of the Mall to improve public use. However, the No Build Alternative is retained as a basis for comparison of the environmental impacts of the LPA and LPA Design Option.

Locally Preferred Alternative (Proposed Action)

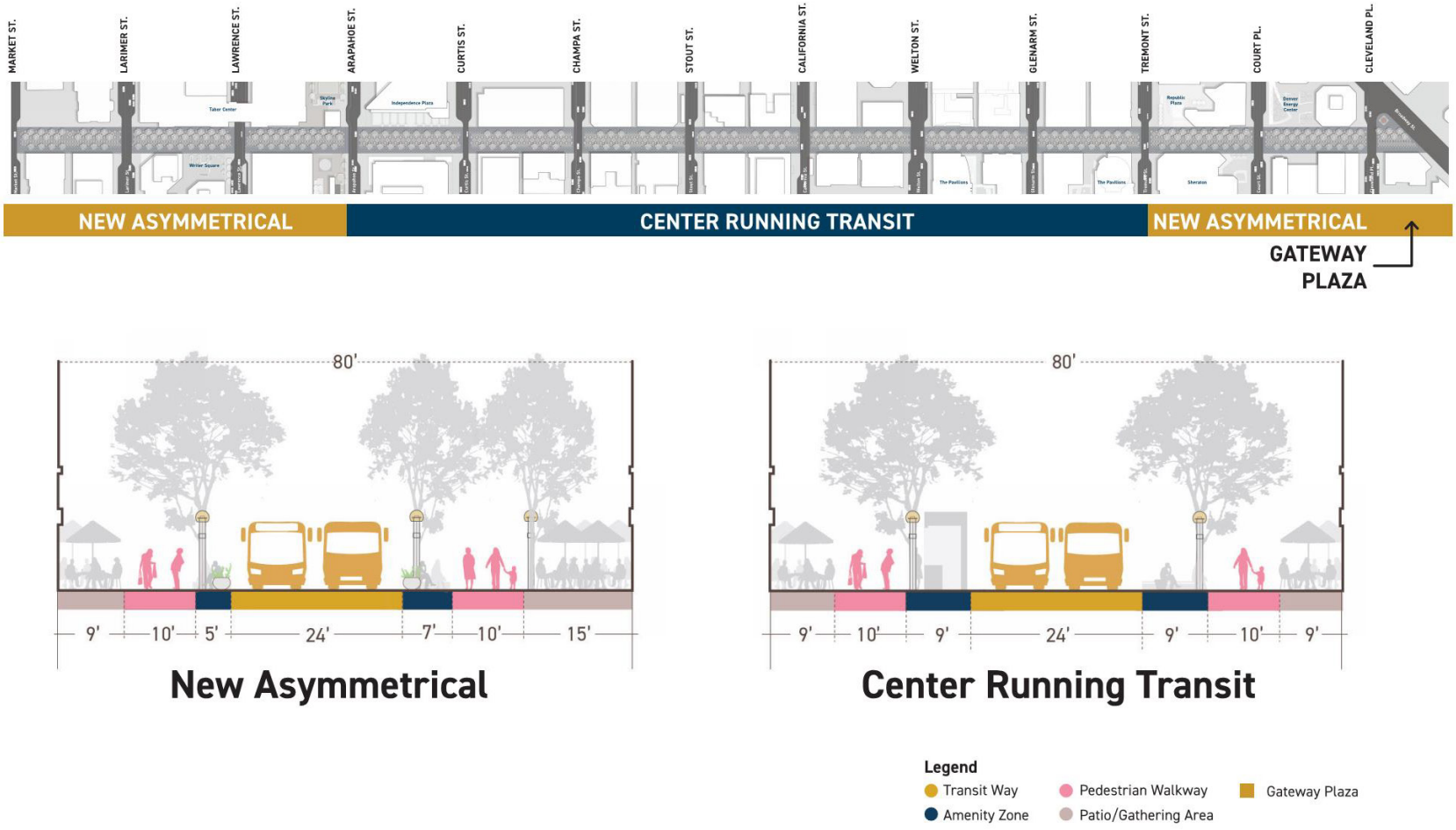
The LPA, illustrated on **Figure ES-4**, includes rebuilding the Mall between Market Street and Broadway to provide the following features:

- Installing a new granite pavement system, new trees, and new underground infrastructure to replace the Mall's failing and deteriorating infrastructure to reduce safety concerns and the negative effects of frequent maintenance and repair activities to the Free MallRide service, as follows:
  - The pavement system would consist of granite pavers with improved surface friction over a new and improved sub-base complete with a system to drain moisture that penetrates the surface.
  - The pattern of the granite pavers would honor and complement the original I.M. Pei–Hanna/Olin design, but would not replicate the pattern in every detail because changes to the existing pattern would be required to accommodate current standards and requirements such as the ADA and safety improvements at shuttle stops.

  - The existing light fixtures, which are replicas of the original design, would be reused and additional replicas would be constructed.
  - New trees, in a variety of species that meet current CCD forestry requirements and that meet similar criteria to those used in the original I.M. Pei–Hanna/Olin design, would be planted in a placement that honors the existing character of the Mall by retaining geometric and spatial relationships of the original design. The trees would be planted in new suspended tree infrastructure that provides 1,000 cubic feet of soil volume for each tree. This amount of soil volume is needed to ensure healthy growth and longevity of the tree canopy.

- Delineating pedestrian walkways from the transit way with an amenity zone, including trees, lights, and furnishings (for example, benches, chairs, planters, and kiosks) to improve safety and security, and reduce potential pedestrian/transit conflicts. The LPA would be designed with a vertical curb at designated shuttle stops, cross streets, and intersections that transitions to a pan at the edge of the transit way. 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 LPA would make use of texture changes in the pavement to better delineate the pedestrian walkway and the amenity zone from the transit way, which would assist visually impaired users in wayfinding. This change in texture would be on the granite pavers and would not adversely impact the historic pattern or materials. The LPA would also include truncated domes at designated crossings and potentially at shuttle stops, directional indicators within the pedestrian walkways to assist visually impaired users, and a transit lane indicator between transit lanes within the transit way.
- Installing bulb-outs at cross streets to reduce the crossing distance for pedestrians on those streets, except for instances where space is reserved for existing bicycle, light rail, or other uses. Changes to pedestrian crossing controls such as crosswalks and crossing signals would be decided during subsequent design phases. Additional intersection improvements to slow traffic and increase pedestrian safety (for example, pavement joint patterns, color and contrast, pavement texture, or raised pavement) will be considered during subsequent design phases.
- Creating wider pedestrian walkways to better accommodate pedestrian volumes and adhere to CCD pedestrian walkway standards, as follows:
  - Pedestrian walkways would be a minimum of 10 feet wide, meeting CCD standards for a 10-foot, clear, unobstructed pedestrian path in Downtown Denver, with a minimum 5-foot amenity zone with trees separating walkways from the transit way.
  - Pedestrian walkways would be set back from the transit way a minimum of 5 feet to allow space for people to gather at shuttle stops without obstructing the pedestrian walkway.
- Continuing operation of the Free MallRide on the Mall between Denver Union Station and Civic Center Station for the useful life of the Project, as RTD's current and planned levels of service for the Free MallRide are not proposed to change as part of the Project.

Figure ES-4. Locally Preferred Alternative Plan and Cross-section Design (Center Running Transit and New Asymmetrical)



*Note: Under the LPA the Gateway Plaza configuration (**Figure ES-3**) would be implemented between Cleveland Place and Broadway.*

- Maintaining an alignment that retains the historic assembly of asymmetrical blocks at the ends of the Mall and symmetrical blocks in the middle of the Mall, and that supports the need for safety, mobility, and increased public use, as follows:
  - The alignment of the median blocks would be configured to provide the transit way in the center of the block and consolidate public space into two equal areas on either side, each consisting of a 9-foot amenity zone with trees, 10-foot pedestrian walkway, and 9-foot patio/gathering area, rather than as it is currently configured; the pattern of the underlying pavement would mimic the Mall's existing color and pattern.
  - The asymmetrical blocks would maintain the existing asymmetrical alignment, with the following modifications: the 6-foot median with light fixtures currently located between the transit ways would be removed; a 5-foot amenity zone with a new row of trees would be added on the narrow side of the block to act as a buffer between the widened 10-foot pedestrian walkway and the transit way; and the pattern of the underlying pavement as it currently exists on the wide (north) side of the block would be shifted to the north 2 feet to provide more space on the narrow (south) side of the block.
  - Except for alterations required for ADA compliance or improved safety, the half-block plaza at Broadway (Gateway Plaza) would be rebuilt with the existing transit way alignment, curbs and pans, configuration of trees and light standards, and a fountain. The wide side of the plaza is wider than that of the adjacent asymmetrical blocks and is not bounded by vertical building facades and patio gates, providing additional pedestrian capacity and public use. No space is needed for transit stops at the plaza because there are no designated shuttle stops there. Delineating the transit way from the pedestrian walkway may require additional improvements, such as furnishings. The existing alignment from the Mall across Broadway to Civic Center Station would be maintained.

Implementation of the LPA will require intergovernmental agreements between CCD and RTD (currently being drafted), which will govern agreements regarding the following:

- Grant funding available to RTD (with CCD as a subrecipient) for the Project, subject to obtaining approval from the FTA, Denver Regional Council of Governments (DRCOG), and RTD Board of Directors.
- Ongoing maintenance of the transit way.
- Ongoing use of the transit way, to ensure transit operations are maintained.
- Ongoing use of the pedestrian walkways to ensure the necessary clear width is maintained for unimpeded pedestrian traffic.
- Funding for maintenance of the amenity zone, pedestrian walkway, and patio/gathering area will continue to be provided through an Intergovernmental Agreement (IGA) between CCD and BID.

Additionally, a Programmatic Agreement that stipulates measures to address the adverse effect to the Mall historic property will be executed prior to completion of the NEPA process; a draft of the Programmatic Agreement is included in **Appendix G**. The agreement stipulates how Section 106 consultation will continue for certain design elements during subsequent design phases.

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; multiple segments may be under construction at one time, and each segment may require multiple construction phases. Construction will occur within the Project limits illustrated on **Figure ES-1**. 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).

Project Impacts and Mitigation Commitments

The No Build Alternative, LPA, and LPA Design Option are analyzed for their impacts to social and environmental resources and on the transportation system. For most resources, impacts between the LPA and LPA Design Option are the same. As summarized in subsequent text, differentiating impacts (both beneficial and adverse) between the LPA and LPA Design Option are identified for economic conditions, cultural resources, visual and aesthetic resources, public safety and security, transit operations, and pedestrian facilities:

- **Economic Conditions:** The LPA more equally distributes the economic benefits of public use to adjacent businesses and property owners when compared to the LPA Design Option, providing more long-term flexibility to support changes in businesses and building uses over time. The reduced 7-foot patio/gathering space width on the narrow side of the asymmetrical blocks under the LPA Design Option (versus 9 feet in the existing condition and proposed LPA) would remove 30 percent of outdoor table seating on those patios, resulting in a less desirable business location than the wide side of the blocks and greater impacts to those property owners and businesses. The reduced outdoor seating under the LPA Design Option would also generate less sales tax revenue, a difference that would directly affect the revenues the BID collects to maintain downtown infrastructure, including the Mall.

- **Cultural Resources:** Both the LPA and LPA Design Option would have an Adverse Effect on the 16th Street Mall historic property. Under the LPA, the Mall would retain its setting, feeling, and location because the footprint would not change, the surrounding buildings would not change, asymmetrical and symmetrical block designs would be provided along the same center and end blocks, and it would continue to be a 12.5-block pedestrian and transit way mall with rows of trees and lights.

  In comparison, under the LPA Design Option the Mall would retain its setting and location, but relocation of the transitions and elimination of the opportunity to have a single row of aligned trees along the length of the Mall would adversely affect both the feeling and integrity of setting.

- **Visual and Aesthetic Resources:** Both the LPA and LPA Design Option would change the appearance of the Mall and enhance visual quality by re-establishing similar but improved tree and pavement infrastructure, creating a straightforward and orderly visual structure, and better defining the transit way and public realm. However, reducing the number of blocks with the asymmetrical design would diminish the size of the asymmetrical end

"rooms" and decrease the visual enhancement of the LPA Design Option when compared with the LPA.

- **Public Safety and Security:** Both the LPA and LPA Design Option increase natural surveillance activity, improving security on the Mall. This benefit is greater under the LPA, because the wider patio area on the south (narrow) side of the asymmetrical blocks would generate higher levels of public activity. The 2-foot reduction of patio space on the asymmetrical blocks under the LPA Design Option reduces the primary generator of public activity on those blocks of the Mall by one-third, resulting in a small decrease in natural surveillance activity on the asymmetrical blocks.
- **Transit Operations:** The lane transitions between symmetrical and asymmetrical blocks would be easier for transit operators to drive through under both the LPA and LPA Design Option than under existing conditions. The improvement under the LPA would be slightly greater because it reduces the existing westbound transit-way lane shift 2 feet more than the LPA Design Option (from 16 feet between the symmetrical and asymmetrical blocks to 4 feet, as compared to 6 feet under the LPA Design Option), creating a more seamless transition.
- **Pedestrian Facilities:** The LPA Design Option would reduce patio/gathering space on the south (narrow) side of the asymmetrical blocks, decreasing patio seating capacity by one-third and resulting in less public use and activation when compared to the LPA.

In addition to meeting the Project's purpose and needs, the Project (both the LPA and LPA Design Option) would have many long-term benefits to social and environmental resources and transportation systems, as described in **Sections 3.0** and **4.0**. The majority of adverse impacts of the Project relate to construction impacts, which would be the same for both the LPA and LPA Design Option, and the adverse effect to the 16th Street Mall historic resource. **Table ES-2** provides a summary of anticipated adverse impacts and mitigation measures for those resources and transportation systems that would experience potential impacts from the LPA.

Impacts and mitigation of the LPA Design Option are not included in **Table ES-2** because the mitigation for adverse impacts of the LPA Design Option would be the same as for the LPA.

Section 3.0 and the technical memoranda in **Appendix B** provide more detailed discussions of the impacts and mitigations associated with each resource.

The following resources are not present in the Project area, and are therefore not included in the EA analysis nor in **Table ES-2**:

- Wetlands/Waters of the United States
- Biological Resources: Wildlife, Natural Vegetation, and Threatened and/or Endangered Species
- Floodplains
- Farmlands
- Mineral Resources/Geology/Soils
- Acquisitions and Displacements

Public Involvement and Agency Coordination

The following information outlines efforts used to engage the public, stakeholders, and agencies and summarizes engagement and outreach efforts for Project scoping, the alternatives analysis process, and coordination through the development of the EA.

Public involvement and stakeholder and agency coordination began with the Project scoping period in May 2017. The following scoping activities were conducted: agency coordination meetings; key stakeholder interviews; meetings with small groups representing advocacy organizations, the hospitality industry, businesses and property owners, and residents; a stakeholder working group workshop; outreach at a Meet in the Street event on the Mall; and a public meeting held on July 27, 2017. Input from the scoping period was taken into account in finalizing the Project purpose and need, developing the range of alternatives, performing alternatives screening, analyzing environmental impacts, and developing mitigation measures.

Small group meetings, stakeholder working group workshops, and public meetings were held during both Level 1 and Level 2 alternatives screening evaluation steps. The first group of meetings provided information on the range of alternatives developed and the results of the Level 1 screening, and gathered input on those results and considerations for the Level 2 screening; the public meeting was held October 18, 2017. The second group of meetings provided information on the results of the Level 2 screening and the recommended LPA, and gathered input for consideration in refinement and analysis of the LPA; the public meeting was held March 8, 2018. Input from these meetings resulted in the development of new alternatives and refinements to alternatives.

The NHPA Section 106 consultation process was initiated in June 2017. The following organizations are participating in the Section 106 consultation process: FTA, RTD, CCD, DDP, the Colorado State Historic Preservation Officer (SHPO), the Advisory Council on Historic Preservation (ACHP), Historic Denver, National Trust for Historic Preservation, Landmark Preservation Commission, Lower Downtown Historic District, and Colorado Preservation, Inc. Ten consulting parties meetings were held between June 2017 and December 2018 to consult on the area of potential effects (APE), purpose and need, identified historic properties, alternatives evaluation criteria, the range of alternatives developed, results of the Level 1 and Level 2 alternative evaluations, design features and details, and potential mitigation measures to address the adverse effect on the 16th Street Mall historic property. Two new alternatives were developed, alternatives were refined, and design options to the LPA were developed based on input received during consultation.

More detail on public involvement and agency coordination is provided in **Section 5.0** and **Appendixes C** and **D**.

EA Public Review Period

The EA is being published for a 30-day public review period.

The EA is available for review electronically on The Mall Experience website: https://www.denvergov.org/themallexperience.

The EA is available for review in hard copy at the following locations:

- Federal Transit Administration, 1961 Stout Street, Suite #13-301, Denver, CO 80294
- RTD FasTracks Office, 1560 Broadway, Suite 700 – Front Desk, Denver, CO 80202
- RTD Main Office, 1660 Blake Street – Front Desk, Denver, CO 80202
- City and County of Denver Public Works Department, Wellington Webb Municipal Office Building, 201 West Colfax Avenue, 10th Floor – Finance Administrative Office, Denver, CO 80202
- Denver Public Library, Central Library, 10 West 14th Avenue, Western & Genealogy – 5th Floor, Denver, CO 80204

Comments on the EA are encouraged. Please submit comments electronically on the project website, or by mail or e-mail to: Susan Wood, RTD 1560 Broadway, Suite 700, Denver, CO, 80202, (Susan.Wood@RTD-Denver.com). Public meetings will be held to present the results of the EA and solicit comments; information regarding the date, location, and time of these meetings will be provided on The Mall Experience website listed previously.

The *16th Street Mall Draft Section 4(f) Evaluation* (FTA, 2019) is concurrently available for electronic and hard copy review at the same locations as the EA.

Table ES-2. Summary of Adverse Impacts and Mitigation Commitments for the Locally Preferred Alternative

Resource	Impacts	Mitigation
Economic Conditions	**Direct Impacts** • No adverse impacts. **Indirect Impacts** • No adverse impacts. **Temporary Construction Impacts** • Temporary impacts to the approximate 370 businesses adjacent to the Project limits. Temporary effects could include disruption of pedestrian flow, noise, and restricted or changed access. • Potential temporary decline in sales of 20 to 40 percent. • Potential temporary decline in sales tax revenue to CCD and RTD.	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD will ensure the construction contractor adheres to CCD ordinance and standards for maintaining access to adjacent properties during construction. • CCD, in coordination with RTD, DDP, and the contractor, with input from businesses adjacent to the Project limits, will develop and implement a Project Management Plan (PMP). The PMP will include, but is not limited to the following measures: – Access: Provide references to applicable information in the Traffic Management Plan (TMP) to maintain reasonable access to businesses and pedestrians during all phases of construction of the LPA; maintain reasonable access for cross traffic and bicycle lanes, except for limited intermittent closures, as well as reasonable access for other connecting transit service; and Free MallRide transit service maintenance. During subsequent design phases, form a Business Impacts Working Group to discuss impacts and construction phasing. – Communication: Communicate regularly with businesses and property owners about the construction schedule. – Additional Signage: Coordinate with DDP to develop signage that directs visitors to businesses during construction. Some of the businesses may benefit from additional signage because of reduced visibility due to construction activities. – Regional Outreach: Conduct public outreach to let the local community and region know that the area is open for business during construction. As Downtown Denver is a regional destination, it will be important to communicate construction schedules and special events to the region and even statewide.

Resource	Impacts	Mitigation
		– Special Events/Marketing: Coordinate additional outreach, special events, and extra marketing with local businesses. These would be particularly important to ensure that visitors and employees know that Downtown Denver and specific businesses remain open for business during periods of construction. – Additional Mitigation: Participate with local business organizations, under the leadership of DDP, to identify other measures the Project could incorporate to mitigate business impacts. Coordinate and continue to work closely with these organizations on specialized outreach, special sales, and extra marketing, in addition to developing a Project-specific outreach and marketing campaign and other measures to reduce business impacts. • The PMP will include the Public Information Plan (PIP). Outreach strategies in the PIP will include the following: – Issue construction updates and post them on the Project website. – Provide advanced notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings. – A public information line of communication will be established and available to field public comments and complaints during construction. – Prepare materials with information about construction. – Address property access issues. – Assign staff to serve as liaisons between the public and contractors during construction. • Construction will be phased to limit the construction timeline in front of single properties.

Resource	Impacts	Mitigation
Cultural Resources	**Direct Impacts** • Adverse Effect to the 16th Street Mall historic property. Impacts would include realignment of the asymmetrical blocks, relocation of the transit ways, conversion of the median to transit way on both the median and asymmetrical blocks, replacement and relocation of trees, introduction of additional tree species, and replacement of the existing granite pavers with new granite pavers. • Change in viewshed from the historic properties adjacent to the Mall. • Potential discovery of unidentified archaeological resources. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Temporary effects to the setting and feeling of the cultural resources adjacent to the Mall during construction of the LPA. • Temporary changes to access to historic properties adjacent to the Mall during construction. • Construction-related vibration not anticipated to reach thresholds for impacts. • Potential discovery of unidentified archaeological resources.	**Direct Impacts** • Measures to mitigate the adverse effect are detailed in the draft Programmatic Agreement (**Appendix G**) and include design commitments to retain historic materials and design concepts as well as a process for developing mitigation in ongoing consultation as the design progresses. The Programmatic Agreement will need to be executed prior to completing a NEPA decision document, should FTA determine to approve the Project. • The Unanticipated Discovery Plan included with the Programmatic Agreement will be followed for archaeological resources. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD will contractually require third-party vibration monitoring, which will include a baseline report, established vibration thresholds for historic structures, and mitigation strategies should those thresholds be exceeded. • The Unanticipated Discovery Plan included with the Programmatic Agreement will be followed for archaeological resources.

Resource	Impacts	Mitigation
Visual and Aesthetic Resources	**Direct Impacts** • Change in appearance of the Mall when viewed from buildings lining the Mall. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Visual disturbances during construction. • Temporary tree and tree canopy removal and reduction.	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • Construction will be phased to limit the duration of major construction activities directly in front of single properties. • Nighttime lighting will be directed downward to reduce the impact of the light on adjacent residences and hotel rooms. • The temporary loss of trees and tree canopy will be mitigated consistent with CCD Executive Order 123, Chapter 8, City Tree Preservation.
Public Safety and Security	**Direct Impacts** • Changes to the Mall design related to ADA compliance. • Potential for public safety threats. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Temporary impacts during construction to police, fire, and emergency response times because of temporary lane or intersection closures within the Project limits.	**Direct Impacts** • Compliance with applicable CCD and RTD design criteria. • CCD, RTD, and DDP will meet with an ADA/Disability Advisory Committee during subsequent design phases to receive input on delineating features and other components of the Mall design related to accessibility. CCD and RTD will establish design criteria during the preliminary design phase. CCD and RTD, in coordination with the contractor, will evaluate design elements like directional indicators and tactile warning strips during the final design phase prior to accepting the design for construction. • CCD will implement a third-party review to verify that the design and construction of the improvements complies with ADA requirements, coordinating with RTD to account for RTD's Free MallRide fleet configuration and capabilities. • CCD, in coordination with RTD, will implement the FTA Safety and Security Certification process, which identifies and minimizes threats to the public during operation of the LPA. The documents for managing this process are anticipated to include the following: – Design basis manual, which includes Crime Prevention Through Environmental Design (CPTED) and other safety and security criteria – Safety and Security Certification Plan

Resource	Impacts	Mitigation
		– Updated Certified Items List (CIL) – Design criteria conformance checklists – Operations and maintenance training CIL or checklist – Operations and maintenance training manuals, CIL, or checklist **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD, in coordination with RTD, will implement the FTA Safety and Security Certification process, which identifies and minimizes threats to the public during construction. The documents for managing this process are anticipated to include the following: – Safety and Security Certification Plan – Updated CIL – Construction specification conformance checklists – Construction safety and security plan (to address risks during the construction phase) • Emergency service providers will be given adequate detour information, including advanced notice before construction, to ensure access is maintained during construction. • The TMP will include protocols for developing detours and communicating with emergency providers.
Land Use	**Direct Impacts** • No adverse impacts. **Indirect Impacts** • No impacts. Temporary Construction Impacts • No impacts.	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. Temporary Construction Impacts • No mitigation required.

Resource	Impacts	Mitigation
Stormwater	**Direct Impacts** • Changes to collection, conveyance, depth and spread of stormwater on the Mall. • Changes to collection, conveyance, depth, and spread of stormwater on cross streets where bulb-outs would be constructed. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Changes to the collection, conveyance, depth, and spread of stormwater for the area under construction and its vicinity. • Potential construction-related sedimentation and water quality impacts, without mitigation.	**Direct Impacts** • Stormwater collection and conveyance systems will be designed and constructed to handle stormwater in compliance with CCD's *Public Works Standards, Details, Manuals, Plans & Studies* (CCD, 2017a). • Stormwater collection and conveyance systems will be designed and constructed to handle stormwater in compliance with applicable CCD design criteria. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD, in coordination with the contractor, will develop and implement a stormwater management plan that specifies temporary best management practices to avoid and minimize soil erosion, sedimentation, and overflow from construction site runoff (for example, silt socks, silt fences, and detention facilities, if applicable). • CCD, in coordination with the contractor, will develop and implement a spill control plan to layout protocols to avoid and minimize the unwanted release of substances during construction as part of a Materials Management Plan.
Noise and Vibration	**Direct Impacts** • Minimal to no impacts. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Construction-related noise. • Nighttime construction-related noise. • Construction-related vibration not anticipated to reach thresholds for impacts.	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • Compliance with CCD Standard Specifications for Construction, General Contract Conditions (2011). • CCD, in coordination with the contractor, will develop a Noise Control Plan that outlines allowable daytime and nighttime construction, Project noise levels, and location and types of noise abatement measures required to meet specific noise limits for the associate construction work. • Compliance with CCD noise ordinance (Denver Code of Ordinances, Section 36) including the following measures:

Resource	Impacts	Mitigation
		– Construction noise limited on weekdays between 9 p.m. and 7 a.m. to ordinance thresholds. – Construction noise limited on weekends between 9 p.m. and 8 a.m. to ordinance thresholds. • CCD will contractually require third-party vibration monitoring. The vibration monitoring requirement will include a baseline report, established vibration thresholds taking into account historic structures, and mitigation strategies should those thresholds be exceeded. • Construction equipment must be properly maintained, used for the manufacturer's intended purpose, and operated in compliance with any required license. • CCD will ensure the contractor implements the PIP, which will include the following outreach strategies to inform stakeholders about construction-related issues such as noise: – Issue construction updates and post them on the Project website. – Provide advanced notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings. – A public information line of communication will be established and available to field public comments and complaints during construction. – Prepare materials with information about construction. – Address property access issues. – Assign staff to serve as liaisons between the public and contractors during construction.

Resource	Impacts	Mitigation
Air Quality	**Direct Impacts** • No impacts. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Release of dust and particulate emissions generated by excavation, grading, hauling, and other construction-related activities. • Exhaust emissions from construction equipment and vehicles are also expected and would include carbon monoxide, nitrogen oxide, volatile organic compounds, and directly emitted particulate matter less than or equal to 10 and 2.5 micrometers in diameter (PM_{10} and $PM_{2.5}$).	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD will ensure the contractor is in compliance with federal and state air quality standards for fugitive dust control, as required in CCD *Standard Specifications for Construction, General Contract Conditions* (2011). Examples of fugitive dust control measures that may be implemented are watering exposed soils and stockpile areas, and covering trucks hauling soil or fine materials. • CCD will contractually require a Construction Air Quality Control Plan and Fugitive Dust Control Plan. CCD will also monitor air quality through the Denver Department of Public Health and Environment monitoring throughout construction. • CCD, in coordination with the contractor, will develop measures to minimize exhaust emissions and exposure to exhaust emissions. The following are examples of measures to limit exhaust emissions that may be implemented: limit unnecessary idling, use alternatives for diesel fuel and diesel engines where possible, locate stationary engines away from residential areas, and use construction equipment that is both the practical engine size for the intended job and properly tuned and maintained. • As part of the PIP, a public information line of communication will be established and available to field public comments and complaints during construction.

Resource	Impacts	Mitigation
Utilities and Infrastructure	**Direct Impacts** • Protection in place, replacement in place, or relocation of utilities within the Project limits. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Potential limited interruption of service.	**Direct Impacts** • Utilities will be relocated in coordination with the utility owner and CCD. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • Disruption of service provided by the existing utilities' infrastructure will be limited to the extent possible. • Temporary interruptions in utility service will be coordinated with utility owners, affected property owners, and tenants. • CCD will ensure the contractor implements the PIP, which will include the following outreach strategies to inform stakeholders about construction-related issues such as the disruption of utility service: – Issue construction updates and post them on the Project website. – Provide advanced notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings. – A public information line of communication will be established and available to field public comments and complaints during construction. – Prepare materials with information about construction. – Address property access issues. – Assign staff to serve as liaisons between the public and contractors during construction. • Detailed existing utility information will be collected prior to the start of construction.

Resource	Impacts	Mitigation
Parklands and Recreational Resources	**Direct Impacts** • No impacts. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Potential temporary restrictions to access to Skyline Park from the Mall, but access would be maintained from other streets. No other recreational resources are located within or immediately adjacent to the Project limits.	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD, in coordination with RTD, DDP and the contractor, will prepare and implement a PMP that will include a plan for maintaining access to Skyline Park during construction.
Social Conditions and Community Facilities	**Direct Impacts** • No adverse impacts. **Indirect Impacts** • Could increase demand for real estate adjacent to the Project limits. **Temporary Construction Impacts** • Community facilities could experience a decline in visitors during construction because of temporary changes to transit and pedestrian facilities, traffic congestion, and impacts to noise, air quality, and visual resources.	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD, in coordination with RTD, DDP, and the contractor, will prepare and implement a PMP and TMP that will include a plan for minimizing and mitigating impacts to the local residents and community facilities. • CCD will ensure the contractor implements the PIP, which will include the following outreach strategies to inform stakeholders about construction-related issues: – Issue construction updates and post them on the Project website. – Provide advanced notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings. – A public information line of communication will be established and available to field public comments and complaints during construction. – Prepare materials with information about construction.

Resource	Impacts	Mitigation
		– Address property access issues. – Assign staff to serve as liaisons between the public and contractors during construction. • Additional mitigation is discussed in this table under Visual and Aesthetic Resources, Noise and Vibration, Air Quality, Transit Operations, Traffic Operations, and Pedestrian Facilities.
Hazardous Materials	**Direct Impacts** • No impacts. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Potential to encounter undocumented soil or subsurface contamination that could harm human health. • Potential to encounter abandoned or undocumented utilities.	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD will ensure the contractor develops and implements a Health and Safety Plan to protect workers. • CCD will ensure the contractor will comply with Occupational Safety and Health Administration requirements for construction workers who may be exposed to hazardous materials. • A trained and certified asbestos inspector will be present to clear any utility material before it's moved or disturbed. • CCD will ensure the contractor develops and implements a Materials Management Plan to ensure removal and disposal of hazardous materials follows all federal, state, and local requirements. • All utilities will be treated as live until confirmed otherwise. • If undocumented contamination is discovered, construction activities will cease until it is determined, in coordination with CCD Department of Public Works and other appropriate regulatory agencies, that work can proceed without risk of injury to persons or the environment.

Resource	Impacts	Mitigation
Environmental Justice	**Direct Impacts** • No impacts. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Temporary impacts to the approximate 370 businesses adjacent to the Project limits, some of which are minority-owned. Effects may include disruption of pedestrian flow, noise, and restricted or changed access. • Potential temporary decline in sales for businesses adjacent to the Project limits, including minority-owned businesses.	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD, in coordination with RTD, DDP, and the contractor, with input from businesses adjacent to the Project limits, will prepare and implement a PMP with the contractor that will include a plan for minimizing and mitigating impacts to local businesses. • CCD will ensure the contractor implements the PIP, which will include the following outreach strategies to inform stakeholders, including environmental justice populations about construction-related issues: – Issue construction updates and post them on the Project website. – Provide advanced notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings. – A public information line of communication will be established and available to field public comments and complaints during construction. – Prepare materials with information about construction. – Address property access issues. – Assign staff to serve as liaisons between the public and contractors during construction.

Resource	Impacts	Mitigation
Transit Operations	**Direct Impacts** • No adverse long-term impacts to Free MallRide operations are anticipated under the LPA. **Indirect Impacts** • No significant, adverse long-term impacts are anticipated under the LPA. **Temporary Construction Impacts** • Temporary construction impacts are based on a range of options for Free MallRide transit service during construction. RTD prefers options that would retain Free MallRide service on the Mall throughout construction. The approaches described in the EA are not final; construction phasing would be evaluated as design and construction planning progresses with consideration to mitigation of impacts. • The range of impacts for the Free MallRide transit service options during construction are as follows: – Increase in travel time: negligible to significant – Stops removed from the Mall: from two to three stops to all stops removed – Ridership loss along Mall and to the RTD System: 15 to 100 percent – FTA grant funding loss: $75,000 to $500,000 per year	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD, in coordination with RTD, DDP and the contractor, will prepare and implement a TMP that will include a plan for minimizing and mitigating impacts to transit service during construction. • CCD will ensure the contractor implements the PIP, which will include the following outreach strategies to inform stakeholders about construction-related issues such as impacts to transit operations: – Issue construction updates and post them on the Project website. – Provide advanced notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings to receive input for proposed options. – A public information line of communication will be established and available to field public comments and complaints during construction. – Prepare materials with information about construction. – Address property access issues. – Assign staff to serve as liaisons between the public and contractors during construction.

Resource	Impacts	Mitigation
	– Impact to RTD users, including people with disabilities: none to full interruption in direct Mall access via the Free MallRide – Impact to RTD fleet: none to requirement for new bus acquisitions for detours – Cost to provide transit service during construction: $1.8 million to $5.0 million per year, or temporarily reconfiguring bus operations through Downtown	
Traffic Operations	**Direct Impacts** • No impacts. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Impacts to traffic on 18th and 19th streets, and possibly 15th and 17th streets, due to Free MallRide detours and/or supplemental bus service. • Reduced road capacity and increased traffic congestion during peak hours because of temporary lane or intersection closures within the Project limits. • Temporary impacts to traffic operations in alleys adjacent to the Mall.	**Direct Impacts** – No mitigation required. **Indirect Impacts** – No mitigation required. **Temporary Construction Impacts** – Obtain and comply with CCD's Street Occupancy Permit. – CCD, in coordination with RTD, DDP and the contractor, will prepare and implement a TMP that will include a plan for minimizing and mitigating impacts to traffic operations during construction. – CCD will ensure the contractor implements the PIP, which will include the following outreach strategies to inform stakeholders about construction-related issues such as impacts to traffic operations: – Issue construction updates and post them on the Project website. – Provide advanced notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings – A public information line of communication will be established and available to field public comments and complaints during construction.

Resource	Impacts	Mitigation
		– Prepare materials with information about construction. – Address property access issues – Assign staff to serve as liaisons between the public and contractors during construction. – The TMP will include adequate detours, including advanced notice and signing, and this information will be provided to the public before construction begins. – Emergency service providers will be given adequate detour information, including advanced notice before construction, to ensure access is maintained during construction. The TMP will include protocols for developing detours and communicating with emergency providers.
Pedestrian Facilities	**Direct Impacts** • Changes to the Mall design related to ADA compliance. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Temporary limited or detoured access on pedestrian walkways.	**Direct Impacts** • CCD, RTD, and DDP will meet with an ADA/Disability Advisory Committee during subsequent design phases to receive input on delineating features and other components of the Mall design related to accessibility. CCD and RTD will establish design criteria during the preliminary design phase. CCD and RTD, in coordination with the contractor, will evaluate design elements like directional indicators and tactile warning strips during the final design phase prior to accepting the design for construction. • CCD will implement a third-party review to verify that the design and construction of the improvements complies with ADA requirements, coordinating with RTD to account for RTD's Free MallRide fleet configuration and capabilities. • ADA access will be included in RTD's Safety Certification Process. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • Obtain and comply with CCD's Street Occupancy Permit. • CCD, in coordination with RTD, DDP and the contractor, will prepare and implement a TMP that will include a plan for minimizing and mitigating impacts to

Resource	Impacts	Mitigation
		pedestrian facilities, including impacts to people with disabilities, during construction. • The TMP will include adequate detours, including advanced notice and signing, and this information will be provided to the public before construction begins. • CCD will ensure the contractor implements the PIP, which will include the following outreach strategies to inform stakeholders about construction-related issues such as impacts to pedestrian facilities: – Issue construction updates and post them on the Project website. – Provide advanced notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings. – A public information line of communication will be established and available to field public comments and complaints during construction. – Prepare materials with information about construction. – Address property access issues. – Assign staff to serve as liaisons between the public and contractors during construction.
Bicycle Facilities	**Direct Impacts** • No impacts. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Temporary impacts to bicycle facilities that intersect with the Mall during lane and/or intersection closures. • The Free MallRide transit way is not considered an impacted bicycle facility, as its use as a bicycle facility is incidental.	**Direct Impacts** • No impacts. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Obtain and comply with CCD's Street Occupancy Permit. • CCD, in coordination with RTD, DDP and the contractor, will prepare and implement a TMP that will include a plan for minimizing and mitigating impacts to bicycle facilities during construction. • The TMP will include adequate detours, including advanced notice and signing, and this information will be provided to the public before construction begins.

Resource	Impacts	Mitigation
		• CCD will ensure the contractor implements the PIP, which will include the following outreach strategies to inform stakeholders about construction-related issues such as impacts to bicycle facilities: – Issue construction updates and post them on the Project website. – Provide advanced notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings. – A public information line of communication will be established and available to field public comments and complaints during construction. – Prepare materials with information about construction. – Address property access issues. – Assign staff to serve as liaisons between the public and contractors during construction.

SECTION 1

Purpose and Need

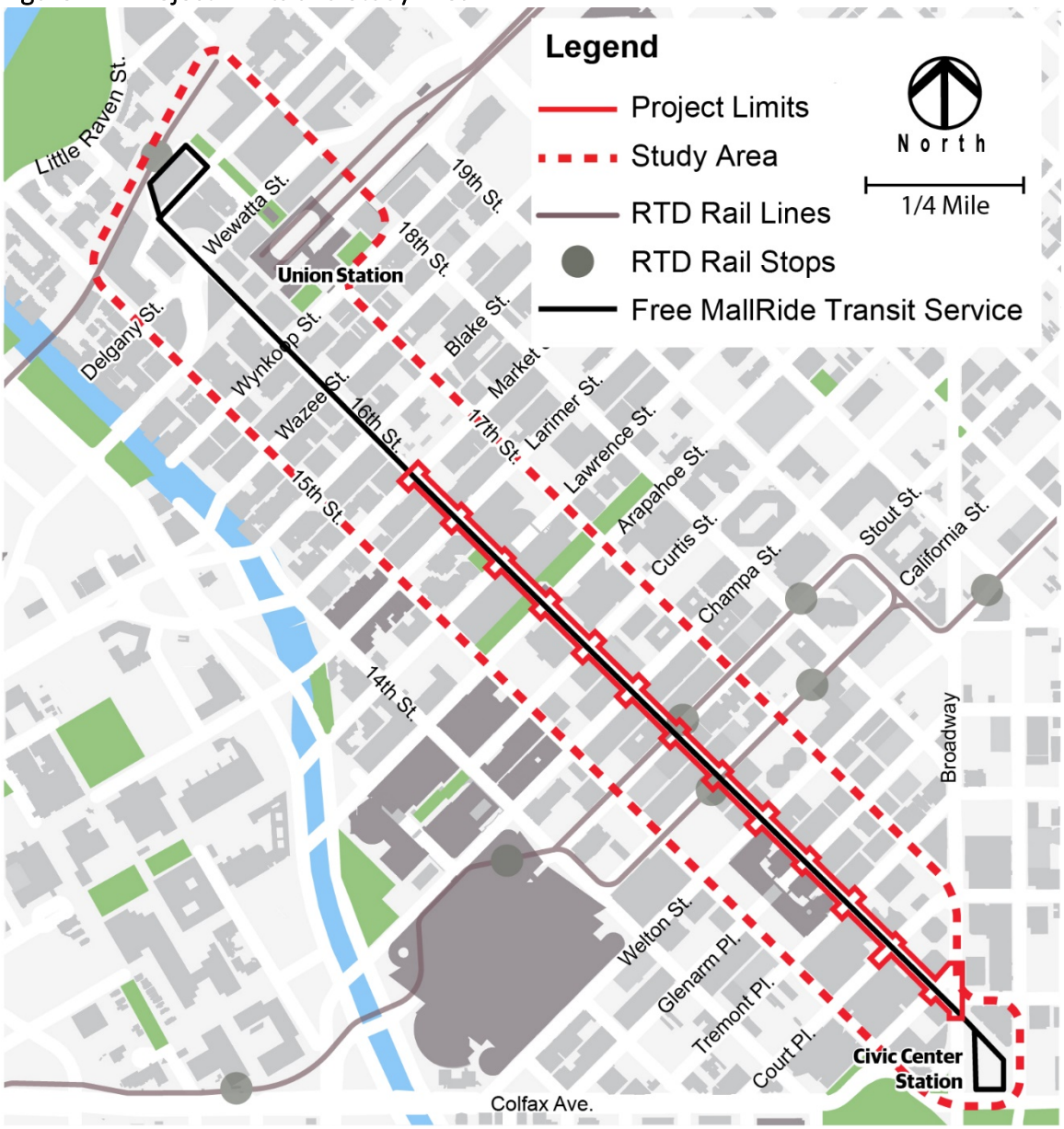
1.1 Introduction

A group of partners comprising the Regional Transportation District (RTD), the City and County of Denver (CCD), the Downtown Denver Partnership (DDP), and the 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 Project). 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 was designed by a team including I.M. Pei and Hanna/Olin, and construction of the Mall was completed in 1982 (I.M. Pei & Partners, 1977). Today the Mall is a hub for mobility and economic activity in downtown Denver.

The National Environmental Policy Act (NEPA) directs decision makers to consider the effects of projects on social, economic, and natural environmental factors in making project decisions. This Environmental Assessment (EA) documents the NEPA process for the Project in accordance with 23 *Code of Federal Regulations* (CFR) 771. The NEPA process is required for the Project because federal funds constitute a portion of the Project's funding.

The Project limits are defined as the 80-foot width of the Mall between Market Street at the western Project limit and Broadway at the eastern Project limit, and include the half-block plaza at Broadway (Gateway Plaza) and the portions 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 transit hub that connects Free MallRide passengers to light rail, commuter rail, and local and regional bus connections. The study area for this 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. The study area is used to document existing conditions and evaluate proposed changes to those conditions. **Figure 1-1** shows the boundary of the EA study area, as well as the Project limits.

Figure 1-1. Project Limits and Study Area



1.2 Purpose and Need

The following sections describe the purpose of, and the need for, the proposed action.

1.2.1 Purpose of the Proposed Action

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, called the Free MallRide, on the Mall while honoring the Mall's use and iconic design.

1.2.2 Need for the Proposed Action

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 potential conflicts between pedestrians and the Free MallRide shuttles.

The following improvements are needed:

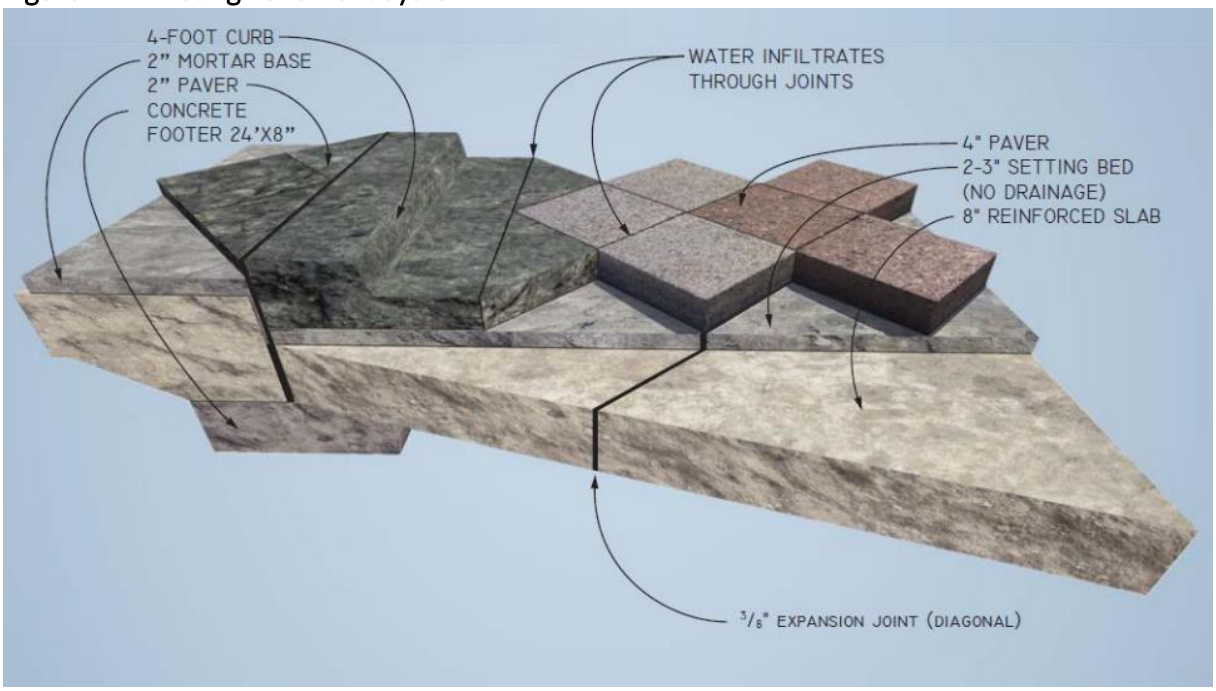
- Address deteriorating infrastructure to allow reasonable maintenance frequency and costs to businesses and taxpayers.
- Improve safety for pedestrians and vehicles.
- Maintain mobility for desired transit operations and for all users.
- Increase opportunities for public use of the Mall as an iconic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

1.2.2.1 Addressing Deteriorating Infrastructure

The Mall was designed and constructed to have a 30-year design life, which was reached in 2012. 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. The Mall's pedestrian area consists of 2-inch-thick 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.

Figure 1-2. Existing 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 is usually trapped there for an extended period of time (**Figure 1-2**). 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 of the pavement system 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).

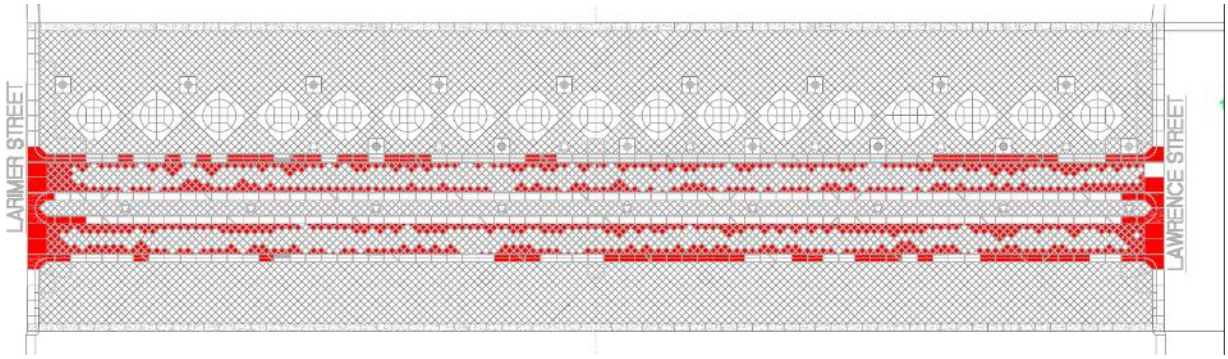
Concerns by RTD over the design and construction methods used to install the pavement system in the transit way led to a settlement with the project architect and the original project contractor in 1987. *A Failure Analysis of the Masonry Pavement of the Sixteenth Street Mall* (Knott and Stevens, n.d.) 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 related to transit way maintenance.

The *16th Street Mall Pedestrian Hardscape Inspection, Repair, and Maintenance Program* (Atkinson, 2015) project report evaluated the condition of pavers on the Mall and cataloged and defined observed granite paver stress conditions as the following: 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 resulting from loading stress.
- Cracked pavers were observed adjacent to utility openings, which create weak points in the pavers.

Figure 1-3 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. Replacing pavers is not a permanent solution, and 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 1-3. Paver Replacement in the Mall Transit Way from 2004 to 2014, Larimer to Lawrence Streets



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

In addition to the moisture damage and noted construction methods, the wheel load from vehicles such as Free MallRide shuttles and delivery vehicles can damage the pavers. Damage to pavers in the pedestrian areas is likely caused by delivery vehicles because it is improbable that the pavers would crack or dislodge from just the weight of pedestrian activity (Atkinson, 2015).

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 Downtown Denver Business Improvement District (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 pavement system continues to deteriorate.

In addition to the pavement system, other elements of the Mall, such as fountains and tree infrastructure, need rehabilitation. The fountains are permanently turned off because the water from the fountains comes into contact with humans and with animal droppings, but lacks proper filtering and sanitation; therefore, the fountains have the potential to transmit water-related illness. The fountains also have structural and maintenance issues comprising nozzle basin leaks, unreliable water level controls and oversized nozzle pumps, and are difficult to clean (Waterline Studios, 2010).

Tree infrastructure on the Mall generally consists of trees, tree boxes, and irrigation. Most of the surviving trees on the Mall within the Project limits are honey locusts. All but 7 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.

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.

1.2.2.2 Improving Safety

The original granite pavers were finished with a flamed finish to provide traction for pedestrians and vehicles. Dirt has filled the finish of the granite pavers, creating a smooth surface and presenting a safety hazard for pedestrians and vehicles. When the pavers are wet or icy, pedestrians can slip on the slick surface, and the Free MallRide shuttles can have a difficult time gaining traction to start and stop. Uneven surfaces causing tripping hazards are also common because of the drainage and freeze-thaw patterns that cause pavers to break or become loose.

Pedestrians and Free MallRide shuttles use the space in close proximity; however, there are currently no strong visual indicators and delineation between the pedestrian walkways and transit way. The pedestrian walkway, curb, and transit way are all constructed of the same granite material, purposefully designed to blend in with each other and create a consistent surface pattern, and do not provide significant visual cues to pedestrians.

Current national guidance and RTD standards recommend visually and physically separating walkways from transit lanes to minimize instances of pedestrians inadvertently walking into the transit way. The Federal Highway Administration (FHWA) *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 pedestrian walkway and transit way (NACTO, 2013 and 2016). RTD *Bus Infrastructure Design Guidelines and Criteria* recommends that pedestrian/transit conflicts be eliminated, or at the least minimized, by separating pedestrian pathways from active bus lanes (RTD, 2016a).

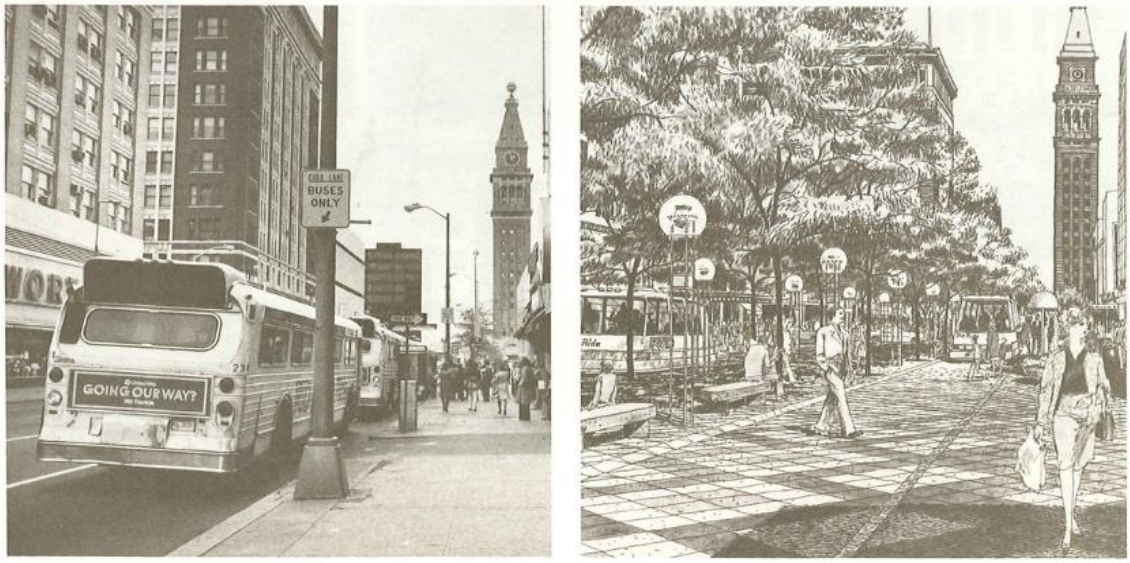
The current configuration of the Mall, particularly in the median blocks, creates a condition where space is constrained for pedestrian traffic during peak hours. Crowding on the undersized pedestrian walkways, which are too narrow to meet CCD downtown pedestrian walkway standards and carry peak hour pedestrian volumes, and the lack of strong delineation between the pedestrian walkway and transit way contribute to pedestrians walking in and across the transit way, causing potential pedestrian-vehicle conflicts and near-misses. A review of existing pedestrian crash and incident and RTD claims data indicate that five times more pedestrian/bus incidents occur in the existing median blocks than in the asymmetrical blocks (**Section 3.4**). Conflicts between pedestrians and Free MallRide shuttles could be reduced through improved design of the Mall that incorporates current best practices for pedestrian and transit way safety.

1.2.2.3 Improving 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). **Figure 1-4** compares 16th Street as it existed before the construction of the Mall and a rendering of the original design for the Mall, as it was constructed.

Figure 1-4. Comparison of 1977 Conditions on 16th Street and the Original Mall Design



Source: RTD, 1977

Pedestrian walkways and a transit way provide and accommodate mobility on the Mall. The Free MallRide shuttle 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). As noted in **Section 1.2.2.1**, maintenance activities on the Mall are increasing as a result of increasing deterioration of the Mall's infrastructure. Maintenance activities can slow down Free MallRide service and reduce transit mobility on the Mall.

Peak hour pedestrian volumes exceed the carrying capacity of the pedestrian walkways on the median blocks on the eastern end of the Mall, reaching up to 4,100 pedestrians per hour during the peak weekday lunch hour. The western end of the Mall reaches up to 3,000 pedestrians per hour near the DUS neighborhood. The current capacity of the two 8-foot pedestrian walkways on the 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 (Gehl, 2016). The 8-foot pedestrian walkways do not meet 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 shuttle stops obstruct the pedestrian walkways on the median blocks and narrow sides of the asymmetrical blocks.

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.[1] Reliable Free MallRide service coupled with increased pedestrian walkway width is needed to accommodate mobility.

RTD research shows that approximately 10 percent of Free MallRide users have a disability or medical conditions that prevents that 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 accessibility that are now required under the ADA. 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.

Bicycles, horse-drawn carriages, and pedicabs are incidental uses allowed on the Mall only during off-peak transit times, because of the Mall's operation as a transit fixed guideway.

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.

16th Street has been a premiere retail destination in the region and an authentic piece of Denver's culture since the 1890s. It was home to the region's major large shopping institutions, such as Daniels & Fisher. By the 1960s, 16th Street had begun to lose some of its allure as a destination (BID et al., 2010). RTD completed an EA in 1978 and selected the "Transitway/Mall Alternative" based on the following criteria: provide more efficient bus service to city and suburban neighborhoods; lessen traffic congestion in downtown; and create a new pedestrian environment in the downtown, a place for people (RTD, 1978). The Mall opened in 1982 and was originally a 12.5-block transit and pedestrian mall between Market Street and Broadway, with a granite paver surface arranged in a diamond pattern inspired by Navajo blanket designs, with further classical inspiration from the floor of the Pantheon, which resembles rattlesnake markings (BID et al., 2010).

[1] 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 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**).

Today, the Mall is a diverse retail destination with a variety of retailers, hybrid retail/entertainment venues, drugstores, tourist-oriented shops, and a variety of restaurants. As a public amenity and retail destination, the Mall attracts users, some of whom use the RTD transit system and 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.

The Mall is the spine of downtown Denver. It is a directional beacon for locals and visitors alike and is often one of the first Denver experiences for new residents and visitors (**Figure 1-5**).

Figure 1-5. Bird's Eye View of the Mall

Source: BID et. al, 2010

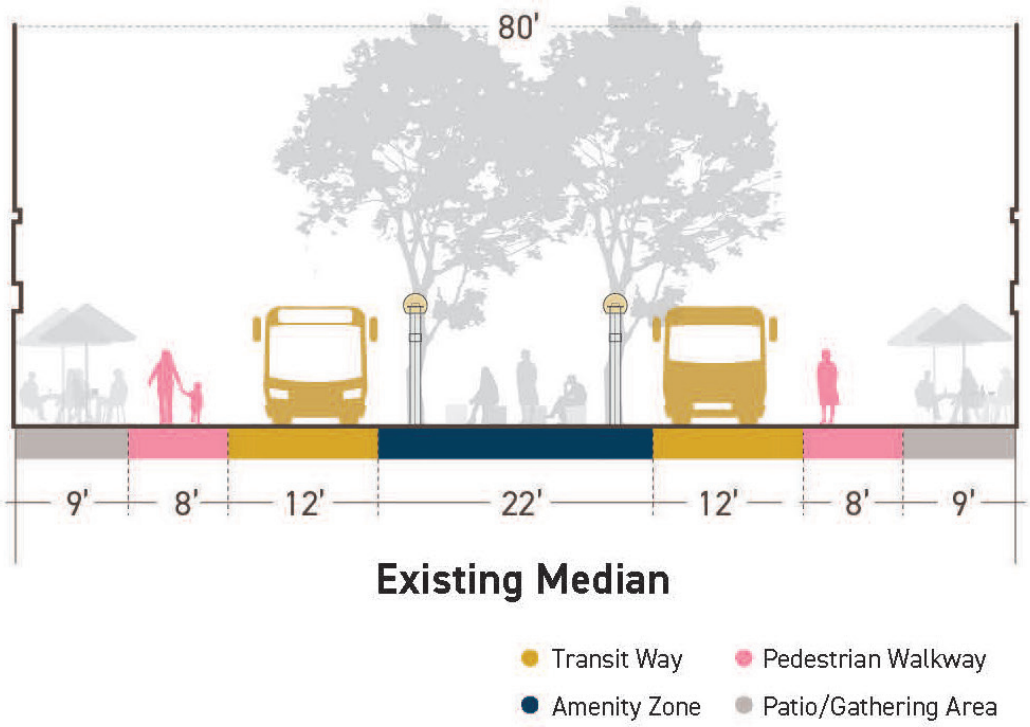
The CCD study *Downtown Denver 16th St Mall: Small Steps Towards Big Change* (Gehl, 2016) evaluated how people currently use the Mall and recommended steps to increase its use as a destination. The study found that only 1 percent of people moving through the Mall stop to spend time on the Mall on an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

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. The Mall's physical design needs to provide the spatial configuration and multifunctionality to accommodate a variety of uses and installations for placemaking.

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" (I.M. 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 and add to the overall retail experience and draw of the Mall, as a public place and amenity. As noted, retail destinations on the Mall attract users that benefit RTD transit service. Additionally, business owners using a patio or café space pay a licensing fee to the BID; the BID uses those funds to maintain and improve the Mall and downtown. 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 shuttle and those waiting at Free MallRide shuttle stops.

Within the median blocks, where transit ways 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 walkways, two 9-foot-wide patio/gathering areas, two 12-foot-wide transit ways, and a 22-foot-wide amenity zone in the median (**Figure 1-6**). The pedestrian walkways and amenity zone in these blocks are not wide enough or separate enough from the transit ways to provide a comfortable public gathering experience, particularly in the median.

Figure 1-6. Cross-section of Existing Median Blocks



The amenity zone in 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 pedestrian areas to the sides of the

Mall, is too small to provide adequate and comfortable gathering space for pedestrians in between the transit ways. The space is underused, as people prefer to gather along the edges, and inherently back away from fast-moving objects like the surrounding shuttles (Gehl, 2016).

The design of the asymmetrical blocks is more conducive to quality public gathering spaces because public space is consolidated into two areas, one on each side of the transit way, rather than divided into three areas separated by transit, as in the median blocks. 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.

Public and stakeholder feedback indicate 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 inhibit 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). Adequate and flexible public space is needed to attract more people to the Mall for quality public gathering activities.

1.2.3 Stakeholder Goals

The lead agencies and stakeholders (**Section 5.0**) have identified desired goals that the Project should address to the extent possible. 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.
- 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.

SECTION 2

Alternatives Evaluation

This section describes the alternatives and design elements considered and how they were developed and evaluated in concert with public and stakeholder input. The Locally Preferred Alternative (LPA) and an LPA Design Option are analyzed in this EA for their ability to meet the Project purpose and need and their effects on environmental resources and the transportation system. Based on the evaluation in this document, the LPA is the preferred Proposed Action for the Project because it would better meet the Project purpose and need and would have greater benefits and fewer adverse impacts to environmental resources and the transportation system than the LPA Design Option.

This section is organized into the following five subsections:

- **Section 2.1** provides a summary of prior planning efforts and proposals for rehabilitation of the Mall.
- **Section 2.2** describes the range of alternatives developed for evaluation.
- **Section 2.3** documents the alternatives evaluation and screening process and results, including the alternatives either eliminated or advanced for the Project and why.
- **Section 2.4** defines the LPA developed by RTD, CCD, and DDP, including capital improvements, transit operations, traffic operations, and construction activities.
- **Section 2.5** describes the LPA Design Option, its origin, evaluation process, and features.

This section references supporting materials, including the *Alternatives Analysis* technical memorandum in **Appendix B**, which includes evaluation processes and matrices, and describes the range of alternatives, including alternatives and design elements that were not carried forward for analysis because they did not meet the Project purpose and need.

The alternatives analysis for the Project was developed with input received during agency, public, and stakeholder scoping activities. Input received during scoping and other outreach activities throughout the NEPA process is summarized and documented in **Section 5.0**.

2.1 Prior Planning and Past Studies

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.

In 2005, the *Downtown Multimodal Access Plan* (CCD et al.) established the Free MallRide service as the cornerstone of downtown Denver's public transportation system and identified continued Free MallRide service as part of the recommendations through 2025. Beginning in 2009, the BID, in conjunction with CCD, RTD, and DDP, evaluated the physical existing conditions and made recommendations for maintaining and renovating the Mall, based on available funding (BID et al., 2009 and 2010). In 2013, RTD prepared and FTA approved a categorical exclusion (NEPA document), which provided environmental clearance for a project to rehabilitate and reconstruct a portion of the Mall. This project was never implemented. In

2015, RTD initiated an alternatives analysis and environmental analysis to identify and evaluate alternative surface materials for the Mall, but no preferred alternative was selected (RTD, 2015b). CCD, in partnership with DDP and the BID, evaluated social conditions and recommendations for improving them (Gehl, 2016). Prior planning and past studies are summarized in the *Alternatives Analysis* technical memorandum in **Appendix B,** and their applicability is further described in **Appendix A**.

2.2 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 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:

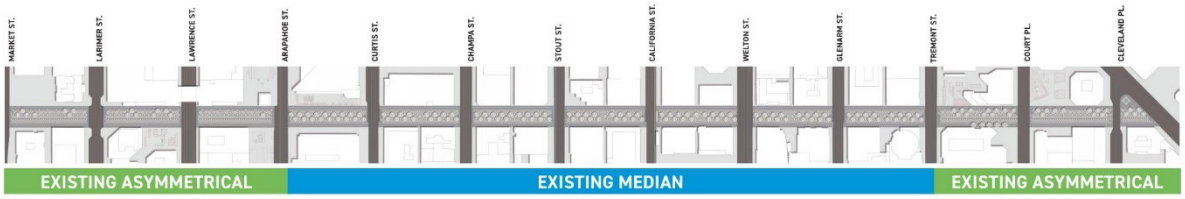
- Three asymmetrical blocks on the western end of the Mall from Market Street to Arapahoe Street, with the transit ways—separated by a small, 6-foot median with light standards—offset from the center of the Mall, creating a wider public space on one side of the Mall than the other.
- Seven symmetrical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

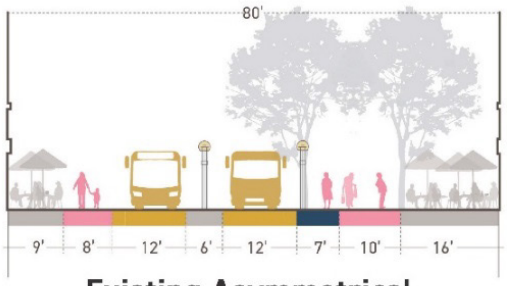
Five build alternatives, with varied configurations of the transit way, amenity zone (in some cases found in a central median), pedestrian walkway, patio/gathering area, and tree placement, were developed and are illustrated on **Figure 2-1**, along with the existing configuration of the Mall (the No 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 the *Alternative Analysis* technical memorandum in **Appendix B**. 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, considered, and either eliminated or advanced for the Project.

2.2.1 No Build Alternative

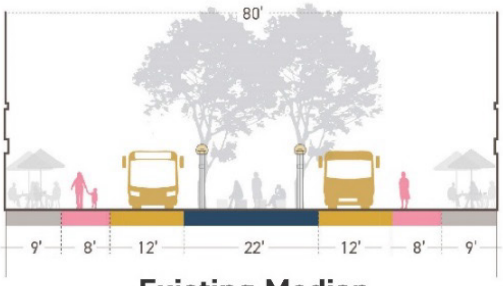
The No Build Alternative represents future conditions without the construction and operation of the Project. The No Build Alternative would maintain the existing alignment and configuration of the Mall (**Figure 2-2**), standard maintenance activities, targeted repairs, and continued implementation of safety strategies, including DDP's Security Action Plan. CCD and RTD have an Intergovernmental Agreement (IGA) through 2022 regarding shared maintenance responsibilities for the Mall.

Figure 2-1. Existing Plan and Cross-section Design

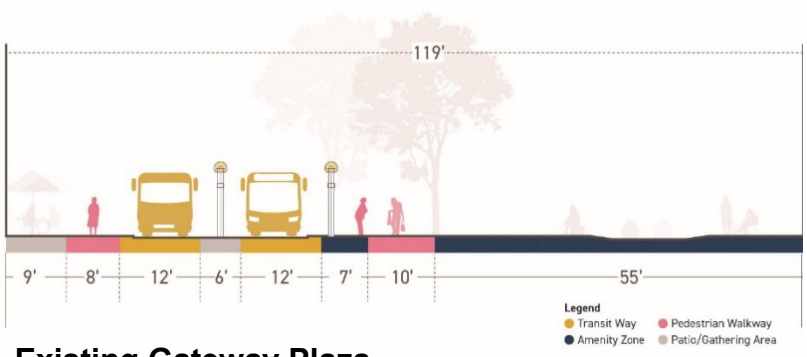




Existing Asymmetrical



Existing Median



Existing Gateway Plaza

The No Build Alternative includes the current transportation system with all committed transportation improvements in the Denver Regional Council of Governments (DRCOG) *2018-2021 Regional Transportation Improvement Program* (2017) and *2040 Fiscally Constrained Regional Transportation Plan* (2015) further described in **Appendix B**.

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.

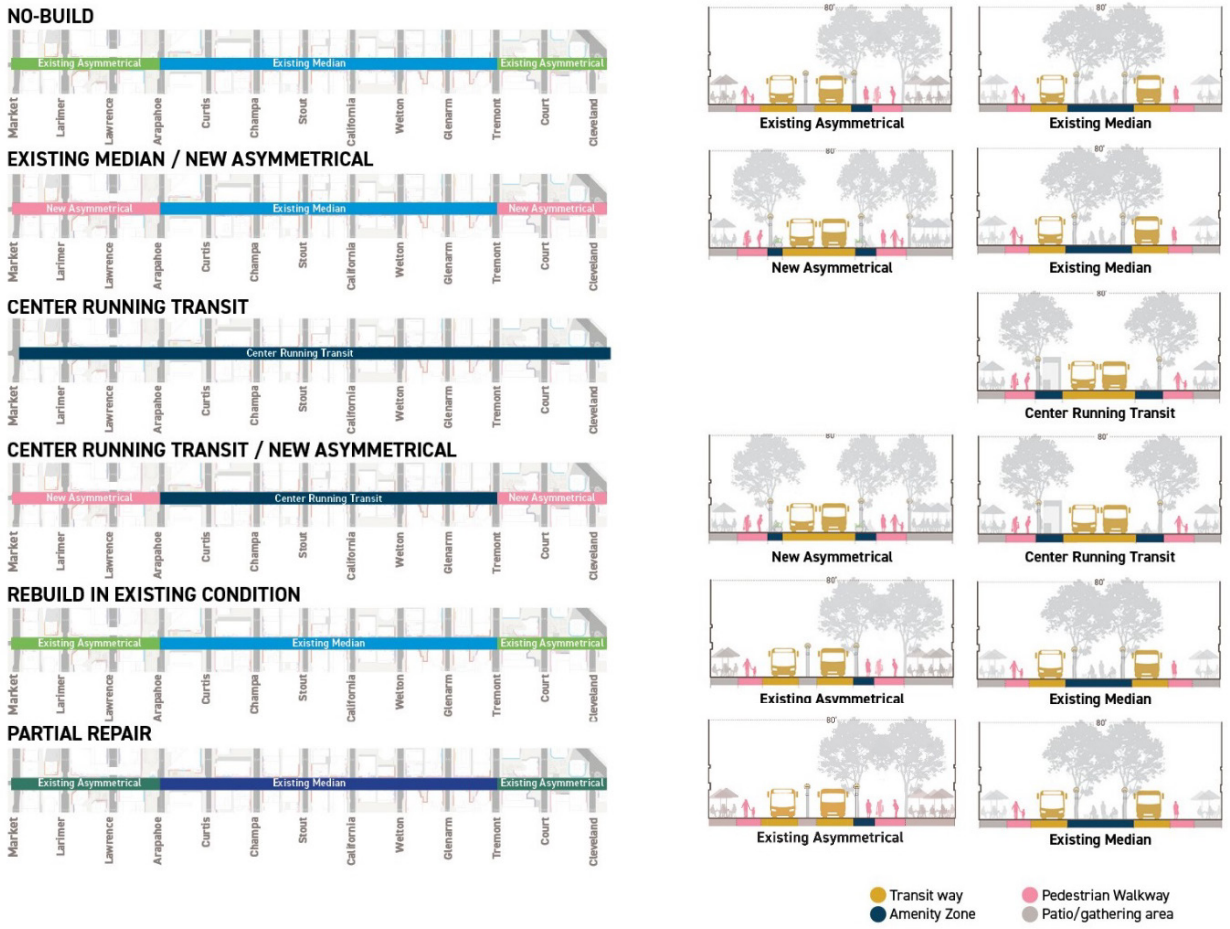
2.2.2 Build Alternatives

The Project Partners developed a range of alternatives based on the Project purpose and need, which include various design elements. These design elements comprise both physical and operational elements and are summarized in **Table 2** in the *Alternatives Analysis* technical memorandum located in **Appendix B**.

The following five build alternatives were developed from these design elements and are illustrated on **Figure 2-2**:

- Median and New Asymmetrical
- Center Running
- Center Running and New Asymmetrical
- Rebuild in Existing Configuration
- Partial Repair

Figure 2-2. Range of Alternatives Carried Forward



*Note: The Gateway Plaza configuration (**Figure 2-1**) could be implemented between Cleveland Place and Broadway under the Existing Median and New Asymmetrical and Center Running and New Asymmetrical alternatives.*

All alternatives 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). Although several design elements were studied that would change transit operations, these design elements were not carried forward into the range of alternatives because they were not feasible and/or would not address the Project purpose and need. Reducing transit service on the Mall or maintaining current service levels and shifting future ridership demand to parallel services (such as bus service on parallel streets or the Free MetroRide) would not meet RTD's service requirements, nor would it accommodate all riders. The Free MallRide eliminates

approximately 870 daily bus trips on downtown streets (Marsella, 2008, pers. comm.). Shifting a portion of the Free MallRide ridership to bus service on parallel streets, in either mixed traffic or a dedicated transit lane, would prevent RTD from providing the needed level of transit service and connectivity. The Free MetroRide on 18th and 19th streets is a parallel service but cannot replace the Free MallRide as a result of its slower travel times in mixed traffic and its location.

Design elements that avoid moving transit-way lanes were considered to address undersized pedestrian walkways (for example, widening pedestrian walkways by narrowing transit-way lanes or patio/gathering areas), but these design elements don't meet requirements for transit operations or patio size and do not meet the Project needs for mobility and public use. **Table 2** in the *Alternatives Analysis* technical memorandum located in **Appendix B** contains additional details on design elements considered during the alternatives screening process**.**

All build alternatives would comply with federal requirements and meet standards such as ADA requirements, homeland security requirements, 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.

2.3 Alternative 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 and community and environmental impacts. Both levels of evaluation focused on evaluating the alternatives on a corridor-wide basis rather than evaluating different designs for individual blocks. The Mall was designed as a corridor, not block-by-block, to be a core economic revitalization driver to activate downtown Denver as a whole. The historic importance of the 16th Street Mall is also reflected as a single historic property in its cohesive corridor experience, rather than a compilation of uses and experiences by individual blocks. Evaluating alternatives on a corridor-wide basis meets the purpose of providing a flexible public space that can be vibrant and sustainable in the long-term, as buildings and ground-level uses change over time.

2.3.1 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. **Table 3** in the *Alternatives Analysis* technical memorandum located in **Appendix B** details the performance of each build alternative and the No Build Alternative against the level 1 screening criteria.

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. All four build alternatives and the new Partial Repair alternative, along with five different pavement options

that would apply to any of the build alternatives and three curb options that would apply to the reconstruction alternatives, were carried into the Level 2 evaluation to analyze costs, safety data, and other criteria.

2.3.2 Level 2 Evaluation

2.3.2.1 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, and that the Partial Repair Alternative additionally would not meet the Project need for infrastructure.

The Level 2 evaluation concluded the Center Running Alternative met the purpose and need for the Project, and that the Center Running and New Asymmetrical Alternative could meet the purpose and need for the Project with some refinements. 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 at the ends of the original Mall; the asymmetrical pavement pattern and double row of trees on one side of the Mall; and the progression 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 meet the Project purpose and need, minimize impacts to the Mall's historic design, and respond to stakeholder input. Specifically, refinements to the asymmetrical block design comprised shifting the transit way closer to the center of the block to allow for an amenity zone with a row of trees between pedestrians and transit on the narrow side of the block. These refinements improved the alternative by doing the following:

- Providing safer conditions by creating an amenity zone with a row of trees that would physically separate the pedestrian walkway and the transit way and provide space for shuttle stops within the amenity zone, so people waiting for the shuttle 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 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.
- 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 purpose and need for the Project.

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 Federal Highway Administration (FHWA) 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* recommend 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, as discussed in **Sections 1.2.2.3** and **Section 1.2.2.4**, mobility and public use are part of the Project purpose and need. The proposed dimensions for the pedestrian walkway and patio/gathering area are to meet those factors of the purpose and need.

2.3.2.2 Pavement Materials Options

Design options regarding pavement materials and curbs could apply to any of the alternatives and were evaluated against the purpose and need and other criteria in the Level 2 evaluation. Pavement options included granite pavers, unit pavers, precast concrete in the transit way and granite pavers in the pedestrian areas, and poured-in-place concrete in the transit way and granite pavers in the pedestrian areas.

The Level 2 evaluation of pavement options concluded that although granite pavers in a mortar bed would be more expensive than the other pavement options and would take longer to construct than concrete pavement options, granite would most minimize harm to the Mall as a cultural resource and was the most-supported pavement system by CCD, owner of the street.

2.3.2.3 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, cross streets, and intersections, and a pan in other locations (**Figure 2-3**). The vertical curb would be 4 to 6 inches tall. The pan 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.

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.

Figure 2-3. Existing Vertical Curb and Existing Pan on Median Block

2.3.2.4 Level 2 Evaluation Conclusions

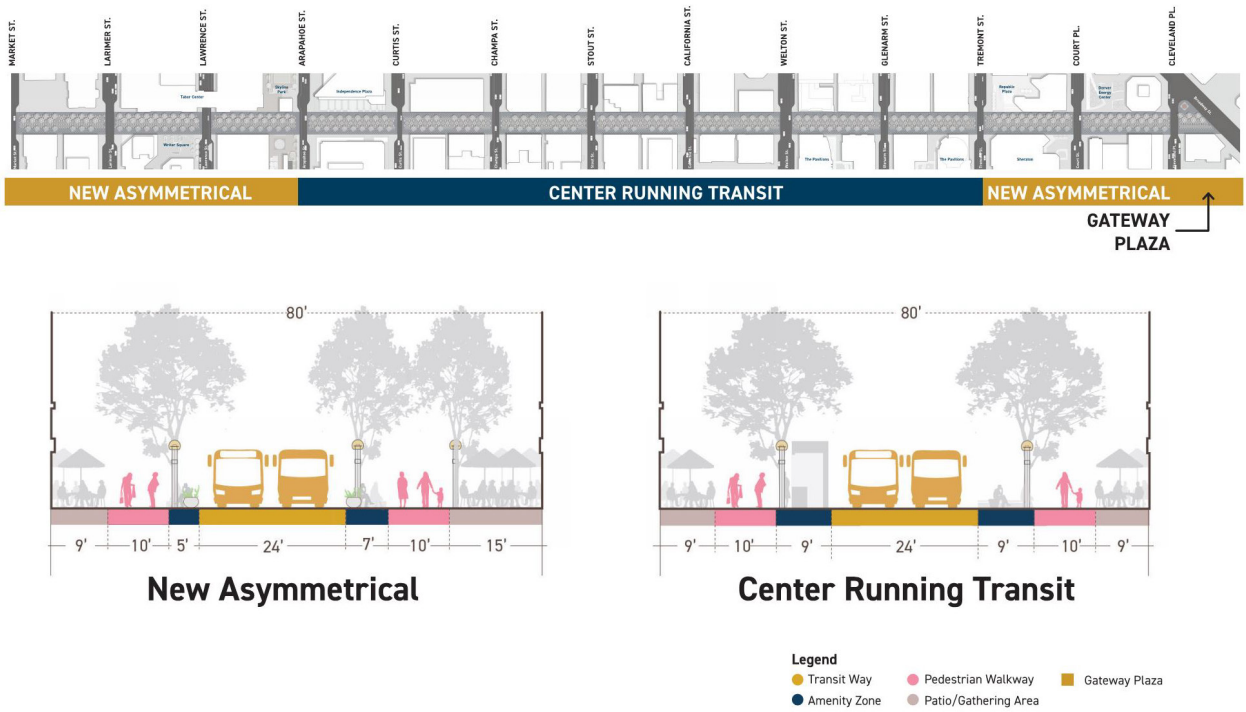
As a result of the Level 2 evaluation, the refined Center Running and New Asymmetrical Alternative with vertical curbs at shuttle stops and a pan along the remainder of the transit way edge, and with granite pavers set in a mortar bed, was selected as the LPA because of its ability to meet the Project purpose and need, as well as minimize impacts to the historic resource.

After the LPA was selected, a design option to the LPA was proposed, which is described in **Section 2.5**. The impacts of the LPA and the LPA Design Option are evaluated and compared in **Sections 3.0** and **4.0**, along with the No Build Alternative. Both the LPA and LPA Design Option are also evaluated in the *16th Street Mall Draft Section 4(f) Evaluation* (FTA, 2019).

2.4 Locally Preferred Alternative (Proposed Action)

This section describes the LPA developed by RTD, CCD, and DDP, including capital improvements, transit operations, traffic operations, and construction activities. **Figure 2-4** illustrates the proposed alignments and delineates pedestrian walkways and the transit way within the proposed alignments. **Appendix F** contains a full corridor plan view of the LPA.

Figure 2-4. Locally Preferred Alternative Plan and Cross-section Design



*Note: Under the LPA the Gateway Plaza configuration (**Figure 2-1**) would be implemented between Cleveland Place and Broadway.*

2.4.1 Capital Improvements

This section describes the capital improvements that comprise the LPA.

2.4.1.1 Alignments and Transitions

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 2-4**). The new asymmetrical cross-section design removes the existing small median with light fixtures from between the transit way lanes, pushes the existing two 12-foot transit way lanes together into a single transit way comprising two adjacent 12-foot transit-way lanes, increases the size of the pedestrian area on the narrow side of the cross-section from 17 to 24 feet, and shifts the pavement pattern and tree and light locations 2 feet north on the wide side of the block. The LPA accommodates the existing bus mirror overhang at the edges of the transit way (approximately 1 foot) safely in the transit way, which, when coupled with the 2-foot shift north in the pavement pattern on the wide side of the block, reduces the pedestrian area on the wide side of the cross-section by 1 foot from 33 to 32 feet. 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.

From Arapahoe Street to Tremont Place, the alignment would be the center-running cross-section design (**Figure 2-4**). The center-running cross-section design places the two existing, 12-foot transit way lanes together into a single transit way comprising two adjacent 12-foot transit lanes, without a median separating them. The cross-section design has equal widths of

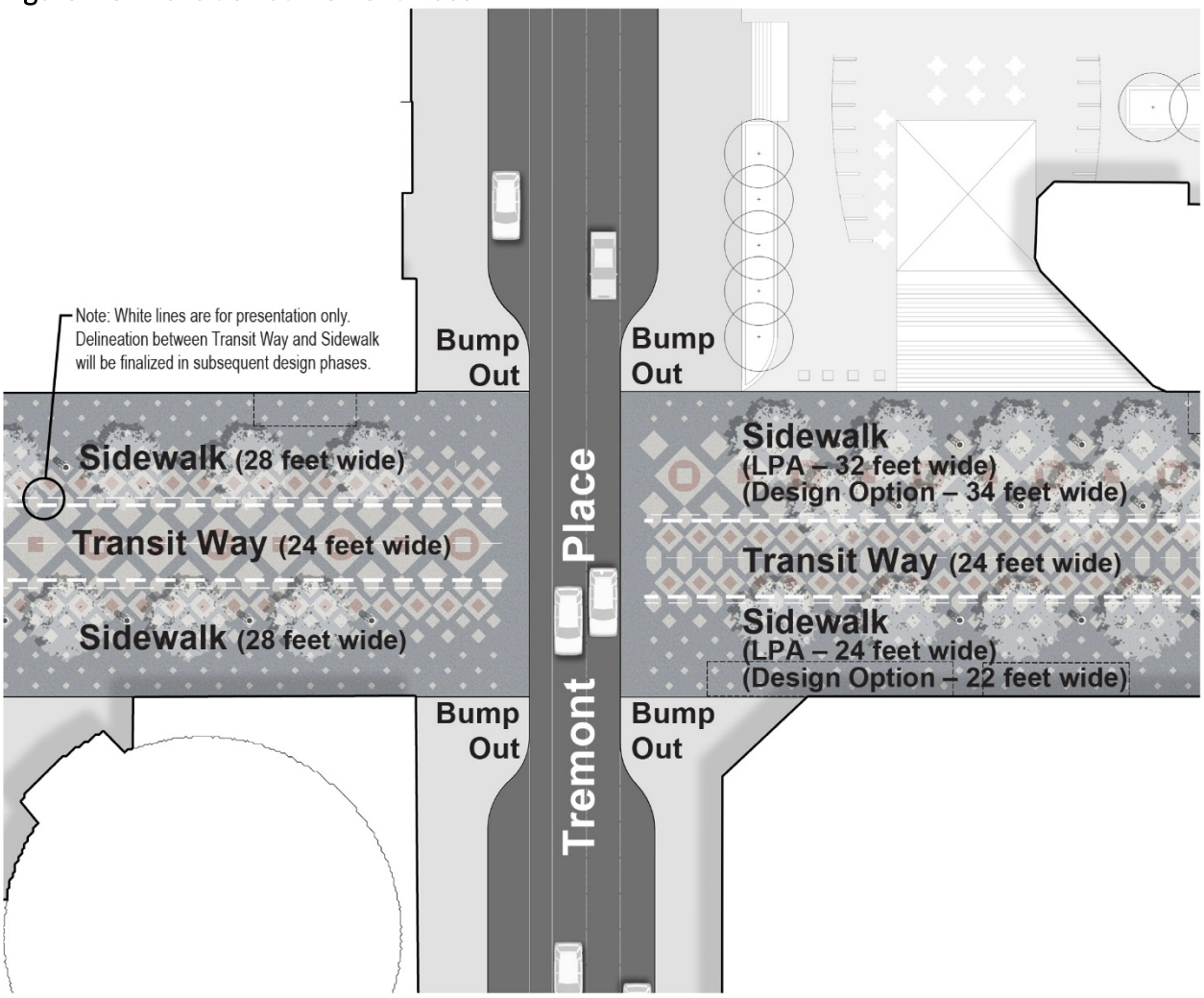
pedestrian area, 28 feet, on each side of the block, which also allows for additional flexibility in programing the space in a manner that would allow more pedestrians to use it. Each pedestrian area would consist of a 9-foot patio/gathering space, a 9-foot tree/amenity zone, and a 10-foot, clear, unobstructed 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 asymmetrical alignment at the half-block gateway plaza between Cleveland Place and Broadway.

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 existing asymmetrical alignment. 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 does not shift and the westbound transit way shifts 16 feet. At the Project limit transitions, the LPA would tie into the existing transit way. **Figure 2-5** illustrates the transition from the center-running cross-section design to the new asymmetrical cross-section design at Tremont Place.

Figure 2-5. Transition at Tremont Place



2.4.1.2 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 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 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 pattern would also be retained in approximately the same spatial relationship in the asymmetrical blocks, but the overall pattern on the wide side of the block would be shifted 2 feet to the north (similar to moving a patterned carpet) to allow for the wider pedestrian area on the narrow side of the block. 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 a 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, reducing or

eliminating the frequent paver damage and replacement currently caused by trapped moisture in the pavement system. 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.

2.4.1.3 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.

2.4.1.4 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 2-3**), 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. The vertical curb would be 4 to 6 inches tall (**Figure 2-6**). The pan 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 (**Figure 2-6)**.

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, and truncated domes at designated crossings and potentially at shuttle stops (**Figure 2-6**). The vertical curb and pan granite units would mimic the existing pattern and colors. 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 and directional indicators. 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 2-6. 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.

2.4.1.5 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. Wi-fi, 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.

2.4.1.6 Safety and Security

The LPA would include a vertical curb at designated shuttle stops, cross streets, and intersections; 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 within the 10-foot pedestrian walkways; and truncated domes at designated crossings and potentially at shuttle stops, consistent with RTD standards (RTD, 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 someone will see them do it.
- Territoriality – placement of 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, the *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.

The LPA would also comply with federal homeland security requirements and RTD's safety design criteria.

2.4.1.7 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.

2.4.1.8 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 transit (LRT) infrastructure. Bicycle and LRT infrastructure would be maintained through the Project limits. The elimination of the median would consolidate pedestrian crossings to two locations at each 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 (e.g., pavement patterns, pavement color, pavement texture, or raised pavement) would be considered during subsequent design phases.

2.4.1.9 Funding and Intergovernmental Agreements

CCD would use Denver Urban Renewal Authority (DURA) Tax Increment Financing (TIF) funds, as well as funds from the 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 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 ongoing use of the transit way by RTD to maintain transit operations and ensure that pedestrian walkways maintain the necessary 10-foot clear width for unimpeded pedestrian traffic.

2.4.2 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 lanes adjacent to each other, with no median or light fixtures between them. 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 (**Section 4.1** contains additional detail about existing and planned transit operations).

2.4.3 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 off-peak 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.

2.4.4 Construction Activities

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

2.4.4.1 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 1-1 (Page 1-2**). 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 **Sections 3.0** and **4.0**, and 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 this document 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 **Sections 3.0** and **4.0**. 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.

2.4.4.2 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).

2.4.4.3 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, and the National Fire Protection Association Standard 130 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.

2.5 Locally Preferred Alternative Design Option

2.5.1 Origin of the Locally Preferred Alternative Design Option

After the LPA was identified, a historic preservation organization requested modifications to the LPA's New Asymmetrical block design during consultation under Section 106 of the National Historic Preservation Act (NHPA). The 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 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. This would eliminate the LPA's 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. The consulting party proposed modifications to these three-and-a-half 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, the consulting party 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 configurations on the Mall.

2.5.2 Level 2 Evaluation of Design Options

CCD and RTD developed two design options to respond to the request. Both design options would extend the Center Running block design one block farther on each end, reducing the size of the asymmetrical rooms on the Mall (**Figure 2-7**). Both design options would modify the asymmetrical block design to eliminate the 2-foot shift in the pavement pattern, trees, and lights on the wide side of the block, reduce the number of asymmetrical blocks, and increase the number of symmetrical blocks. The design options varied in where the 2-foot difference on the narrow side of the block would occur: Design Option 1 would reduce the amenity zone by 2 feet, and Design Option 2 would reduce the patio/gathering space width by 2 feet (**Figure 2-8**).

Both design options would reconstruct the half-block triangular plaza block from Cleveland Place to Broadway with pavers in the same pattern and location as the original design; other

elements of the half-block, including the lights, trees, and fountain, would also be reconstructed in same location.

Figure 2-7. Existing and Design Option Plan Views

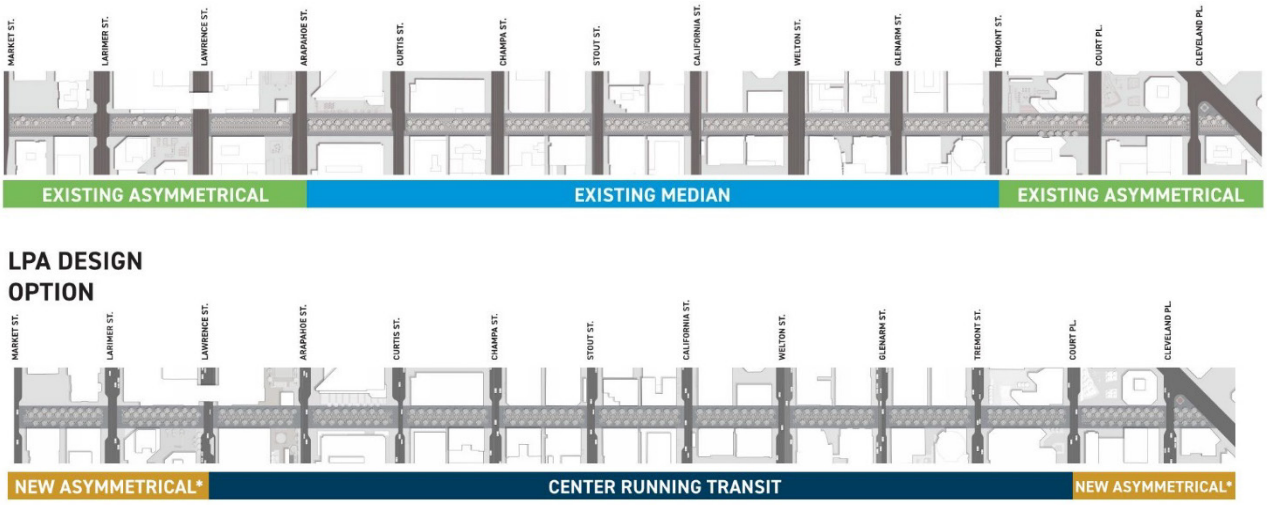
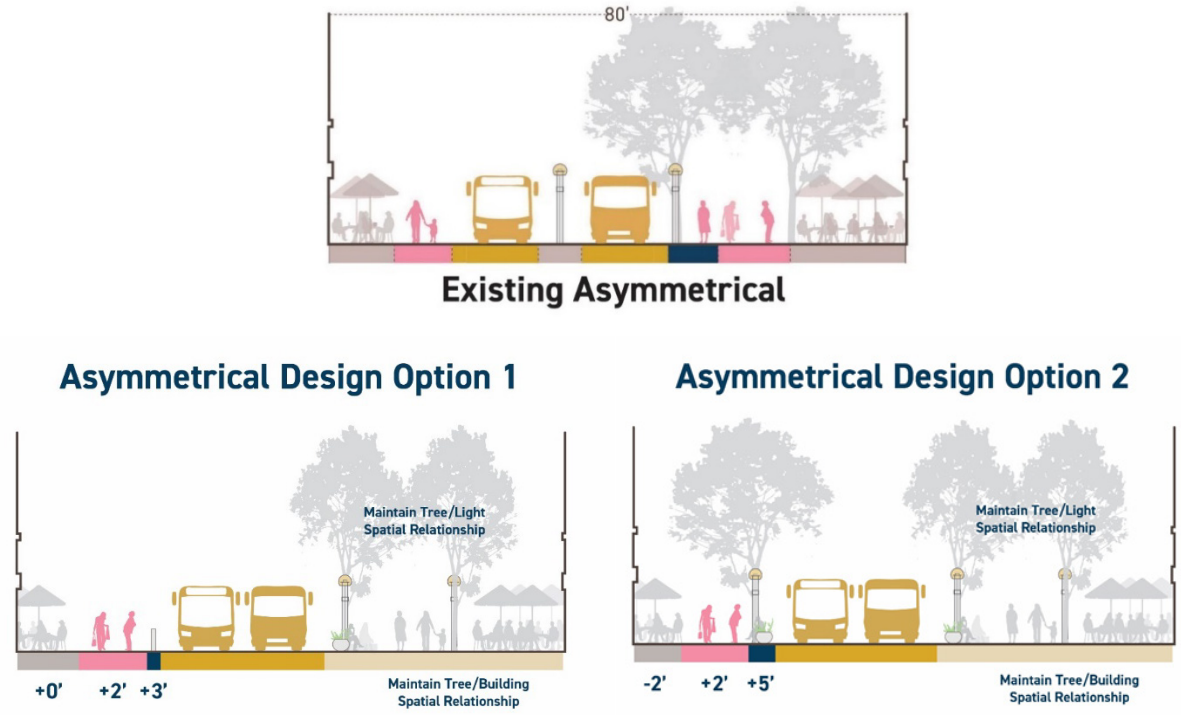


Figure 2-8. Existing and Design Option Cross-sections



2.5.3 Level 2 Evaluation Conclusions

The Level 2 evaluation concluded 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, which are critical elements of the public use and safety perceptions; requires vertical bollards, which are undesirable new visual elements, to safely separate pedestrians and transit; and would require a secondary light source for adequate nighttime lighting. As a result of the lack of adequate

amenity zone and the undesirable visual effect of the vertical bollards within the historic context of the Mall, Design Option 1 was eliminated from further consideration.

Although Design Option 2 would not meet the public use needs of the Project as well as the LPA, it would better meet the purpose and need and have fewer impacts than Design Option 1, and it was carried forward as the LPA Design Option evaluated in the EA.

2.5.4 Features of the LPA Design Option

The LPA Design Option would be the same as the LPA for all design features, operations, and construction activities listed in **Sections 2.4.1.3 through 2.4.1.9** and **Sections 2.4.2 through 2.4.4**. The differences between the LPA and the LPA Design Option are the alignments and transitions of the asymmetrical and center-running blocks and the pavement pattern. The LPA alignments and transitions are discussed in **Section 2.4.1.1**, and the LPA pavement pattern is discussed in **Section 2.4.1.2**.

From Market Street to Lawrence Street (versus Arapahoe Street in the LPA) the LPA Design Option alignment would be a modified asymmetrical cross-section design (**Figure 2-9**) (versus the LPA New Asymmetrical cross-section design [**Figure 2-4**]). The modified asymmetrical cross-section design removes the existing 6-foot median with light fixtures from between the transit-way lanes, pushes the existing two 12-foot transit-way lanes together into a single transit way comprising two adjacent 12-foot transit ways, 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), and maintains the pavement pattern and tree and light locations in the pedestrian area on the wide side of the cross-section (versus shifting them 2 feet north in the LPA). The LPA Design Option accommodates the existing bus mirror overhang at the edges of the transit way (approximately 1 foot) safely in the transit way, as does the LPA, resulting in a net 1-foot gain in usable space outside the transit way on the wide side of the block compared to existing conditions. 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 9 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 LPA Design Option alignment would be the center-running cross-section design (**Figure 2-9**). The LPA 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 2.4.1.1**.

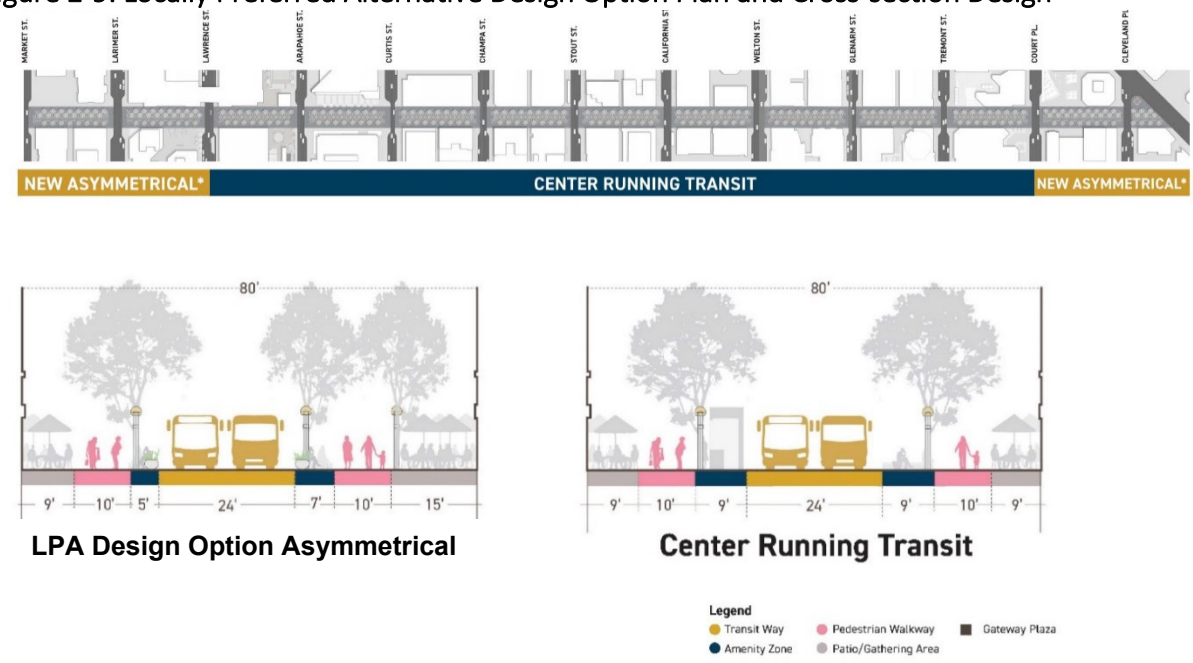
From Court Place (versus Tremont Place in the LPA) to Cleveland Place, the LPA Design Option alignment would, again, be the modified asymmetrical cross-section design (versus the LPA New Asymmetrical cross-section design), with a transition to the existing conditions of the half-block gateway plaza between Cleveland Place and Broadway (**Figure 2-1**).

The LPA Design Option curbs would be constructed in the same manner as described for the LPA in **Section 2.4.1.4**, with vertical curbs at designated shuttle stops, cross streets, and intersections and a pan along the remainder of the transit way.

The LPA 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 does not shift and the westbound transit-way lane shifts 16 feet. At the Project limit transitions, the LPA Design Option would tie into the existing transit ways. **Figure 2-5** illustrates the transition from the center-running cross-section design to the new asymmetrical cross-section design at Tremont Place.

The LPA Design Option would not shift the pavement pattern on the wide side of the asymmetrical blocks; the pavement pattern and tree and light locations would be reconstructed in the same location as they currently exist.

Figure 2-9. Locally Preferred Alternative Design Option Plan and Cross-section Design



SECTION 3

Environmental Resources

This section describes the environmental analysis and impacts associated with the No Build Alternative, LPA, and LPA Design Option. A description of each alternative is provided in **Section 2.0**. A detailed analysis was completed for the following four environmental resource categories for which the LPA and LPA Design Option could have long-term impacts:

- Economic Conditions
- Cultural Resources
- Visual and Aesthetic Resources
- Public Safety and Security

Each detailed analysis includes review of applicable regulatory context; an account of the affected environment; description of methodology used to evaluate each environmental resource; disclosure of potential impacts; and measures to avoid, minimize and/or mitigate environmental consequences. The disclosure of potential environmental consequences covers long-term (operations) direct, short-term (construction) direct, indirect, and cumulative impacts.

The following is a list and definition of impacts evaluated in this section:

- **Long-term impacts** will occur after construction is complete.
- **Short-term impacts** will be associated with construction activities and will be temporary.
- **Direct impacts** are caused by the proposed action and "occur at the same time and place as the proposed action" (40 CFR 1508.8).
- **Indirect impacts** are caused by the proposed action and "are later in time or further removed in distance, but are still reasonably foreseeable" (40 CFR 1508.8).
- **Cumulative impacts** result from "the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually-minor but collectively-significant actions taking place over a period of time" (40 CFR 1508.7). The *Cumulative Effects* technical memorandum located in **Appendix B** provides additional context for the cumulative impacts evaluation, including the methodology, study areas, and past, present, and reasonably foreseeable future actions.

Resources with no or minimal long-term impacts resulting from the LPA and LPA Design Option are summarized in **Section 3.5** and **Table 3-11**. **Section 3.5** summarizes the analysis, highlights applicable conclusions, and provides the reader with a reference to applicable technical documentation for the following environmental resource categories:

- Land Use
- Stormwater
- Noise and Vibration
- Air Quality
- Utilities and Infrastructure

- Parklands and Recreational Resources
- Social Conditions and Community Facilities
- Hazardous Materials
- Environmental Justice

The following environmental resource categories are not present in the Project study area and are not discussed in this EA:

- Wetlands/Waters of the United States
- Biological Resources such as Wildlife, Natural Vegetation, and Threatened and/or Endangered Species
- Floodplains
- Farmlands
- Mineral Resources/Geology/Soils
- Acquisitions and Displacements

3.1 Economic Conditions

3.1.1 Laws, Regulations, and Orders

NEPA (in 40 CFR 1508.14) and FTA guidance on implementing NEPA require the consideration of impacts to the human environment, including economic resources.

3.1.2 Methodology

The methodology for the economic section is based on the RTD *Environmental Methodology Manual* developed for transit projects (RTD, 2008). The manual suggests that existing businesses and fiscal impacts, including sales and property tax revenues, be analyzed compared to the No Build Alternative.

The study area for the analysis is driven by data availability. A discussion of broader economic conditions focuses on downtown – the DUS and Central Business District (CBD) neighborhoods – compared to the city of Denver. An examination of existing businesses focuses on businesses directly on the Mall and adjoining side streets. The sales tax analysis is based on the BID boundaries, which include the Mall, the DUS and CBD neighborhoods, and neighborhoods outside of the immediate downtown area.

The duration of impacts was based on the four construction phasing options provided herein.

3.1.3 Existing Conditions

The Mall is located in the DUS and CBD neighborhoods of Denver. Since 2012, more new development projects have been built in the DUS neighborhood than in the CBD. New construction around DUS has focused on residential and office development, while several new hotels have been built in the CBD neighborhood. Development has favored the DUS neighborhood in part because more land is available there.

Since 2012, downtown Denver has seen an increase in retail sales, hotel room rates, and office lease rates. Challenges to the area include mixed retail market fundamentals, increased vacancies, and decreased retail lease rates. The office market at the eastern end of the Mall

consists primarily of older building stock and has higher vacancies and lower lease rates than other portions of downtown, which detracts from the downtown office market. The office market at the western end of the Mall near DUS is experiencing much higher investment and performing very well. The number of for-sale homes has remained flat in the past 5 years, while the number of apartments in downtown Denver has dramatically increased.

3.1.3.1 Existing Businesses

Retail, restaurant, and service businesses, offices, and residences are located directly along the Mall. Business establishments are oriented to Mall visitors and downtown employees, but also serve residents and tourists.

Table 3-1 summarizes businesses on the Mall between Market Street and Broadway. The potentially affected businesses include those at street level, subterranean eateries, restaurants grouped together on second floors, and stores at the Pavilions. Mall businesses are primarily restaurants and retail stores, with local establishments outnumbering national establishments. The national establishments tend to be larger and have more employees and greater revenues; many of the local businesses tend to be relatively small and located in a multi-tenant setting. The mix of local and national businesses and the key markets served vary along the length of the Mall. Some portions of the Mall are more successful than others, having higher lease rates and fewer retail vacancies. More detail on businesses in the study area is provided in **Appendix B**.

Table 3-1. Businesses along the Mall, July 2017 (Broadway to Market Streets)

Business	National Businesses	Locally Owned Businesses	Total Number of Businesses	Percent of Total
Restaurants	52	87	139	37.4
Retail and Other	50	74	124	33.3
Services	42	67	109	29.3
Total	144	228	372	100.0

Source: InfoUSA, 2017; ArLand, 2017

3.1.3.2 Sales Tax

Within the BID, which includes the Project limits, sales tax revenues in 2016 were about $37.6 million. This is approximately $6.8 million higher than it was in 2012, a 22-percent increase in 5 years. The financial growth in the BID and the general downtown area is attributable to five industries: Hotel and Other Accommodation Services, followed by Restaurants, Business Administration, Support and Waste/Remediation, and Clothing/Accessory Stores. Sales tax revenues from these five industries increased by about $7.6 million since 2012, which offset losses in other industries such as Manufacturing, Motor Vehicles/Auto Parts, and Information Producers/Distributors.

In 2016, sales tax collections in the BID were 5.6 percent of total city sales tax collections of $676 million. Both restaurants and retail stores within the BID and the City of Denver have seen an increase in sales tax collections from 2012 to 2016. Sales tax collections from restaurants within the BID increased by about 14.5 percent, while collections City-wide rose by over

37 percent. Retail sales tax collections rose by about 11 percent within the BID yet rose by almost 46 percent city-wide. As a result, retail sales tax collections within the BID represented about 2 percent of Denver's collections in 2016. **Appendix B** provides additional detail on sales tax collections by industry from 2012-2016.

3.1.4 Impact Evaluation

3.1.4.1 No Build Alternative

Under the No Build Alternative, there would be no temporary construction impacts to businesses or sales taxes as there would be no construction.

Although ridership is anticipated to grow, the combination of maintenance issues and inefficient use of areas suitable for pedestrian and business activities could result in the continued deterioration of the Mall experience for visitors and tourists, resulting in less economic vitality than would occur if the Project needs are met. Because the Mall is downtown Denver's entertainment, retail, and restaurant hub, the decline could spread beyond the Mall.

3.1.4.2 Locally Preferred Alternative

Short-term Direct and Indirect Construction Impacts

Businesses. Construction of the LPA would result in temporary impacts to the approximately 370 businesses adjacent to the Project footprint. The businesses most affected would be those within the zone of construction. Some business access points could be temporarily moved to side streets or alleys, therefore businesses without alley or side street access would be most affected. Depending on the construction phasing, from 1 to 6 blocks are assumed to be affected at any one time. Temporary effects would include disruption of pedestrian flow, noise and restricted or changed access. Businesses with alternate access on cross streets could experience intermittent closures of their access on the Mall during an approximately 8- to 12-month period of construction on each block. Businesses with no alternate access would have their access on the Mall maintained during business hours. Rare exceptions could occur where a business access would need to be closed during business hours for several hours; in these instances, coordination with businesses would occur to mitigate the impact of temporary access closure.

Despite efforts to maintain access and minimize construction inconveniences, some businesses could suffer a temporary decline in sales. Research for other similar projects suggest that the decline in sales will depend on the type of business and the fidelity of the clientele. Businesses that rely heavily on walk-in customers are more likely to be negatively affected by construction because of people avoiding the area. For the purposes of the analysis, the general temporary decline in sales for the affected business is from 20 to 40 percent with many dependent factors (Gulf Coast Institute; EconnNorthwest et al., 2002; Ray, 2017). Businesses with a marginal capital base are likely to be the most affected. Potential negative impacts might be offset by construction workers who purchase goods and services in the study area during Project construction. Business activity is expected to increase after construction upgrades on individual blocks along the Mall. The specific economic effects of these temporary disruptions are speculative because the final construction phasing option has not been selected. There are advantages and disadvantages to all of the options being considered. For example, phasing options that take transit off the Mall (**Section 4.1**), by providing replacement service on the Free MetroRide or other parallel streets would potentially have the greatest effect on

businesses, as approximately 39,000 patrons per day would be dislocated during the construction phase.

Phasing options that maximize the maintenance of transit service on the Mall but require a longer construction period would prolong the impacts and are likely to have a greater negative effect on business. Strategies that minimize the length of construction while maintaining access to the affected enterprises and at least a partial transit service to the Mall are anticipated to have the lowest effect on business.

Indirect impacts to business adjacent to the study area may occur as the result of patrons frequenting businesses located off the Mall, to avoid the inconveniences of construction. The construction of the LPA would have no indirect impacts to the larger downtown Denver area.

Sales Tax. Under the LPA, both short-term and indirect construction impacts would be correlated and similar to those described for businesses with the accompanying reduction in sales tax. That is, temporary losses in business sales translate into lower sales tax revenue.

Long-term Direct and Indirect Impacts

Businesses. After construction is completed, it is anticipated that the LPA would result in long-term, direct, positive impacts to business revenues adjoining the Mall. The benefits include improvements to transit and pedestrian mobility, infrastructure, safety and security, and greater public use.

Over time, downtown Denver has prospered with associated property value and business revenue increases. Because transit would continue serving the Mall, the flow of customers would remain. Compounding this effect, is the fact that transit ridership is projected to nearly double over the planning period, funneling additional customers to local businesses and expanding sales.

No permanent direct changes in access to any businesses would occur because of the Project. Any business access affected during construction would be restored in the same location and manner as before construction. Therefore, there will be no negative direct impacts to local business associated with the LPA.

The indirect impacts are likely to be variable and dependent on business type. A prospering business community along the Mall is anticipated to be indirectly beneficial to most businesses in the BID. Conversely, it is possible that certain types of business will be afforded a competitive advantage resulting from a Mall location, indirectly affecting the success of a competitor located on an adjacent street (for example, on 15th, 17th, or 18th Streets).

Sales Taxes. The projected positive direct and indirect impacts previously described would correlate into increased sales tax revenues.

Cumulative Impacts

The cumulative impact of the LPA with other downtown development presents both disadvantages and advantages. However, the advantages are expected to greatly outweigh the disadvantages.

Cumulative Disadvantages. The cumulative disadvantages of the LPA are short-term. As acknowledged throughout this document, the construction of the LPA, along with the near simultaneous erection of high-rise buildings and other redevelopment projects will increase the

noise and traffic congestion in downtown Denver. There will be some loss of access to local business resulting in short-term declines in revenues and sales taxes in the blocks immediately affected by construction. This condition is not unique to the Mall and history has shown that when construction activity is pronounced in Denver, the region prospers despite the inconveniences.

Cumulative Advantages. The reconstruction of the Mall is one of many civic improvements that have been occurring in the downtown area. As previously discussed, this area is experiencing above-average economic prosperity because of the economy in general and numerous public and private investments in Denver. The Mall is an iconic feature of the city and represents a key transportation link between CCS, DUS, and Denver International Airport. The LPA will elevate the architectural quality of the Mall, to equal the investments that have been made to CCS, DUS, and Denver International Airport, providing a welcoming entry into the city and a cumulative stimulant to its prosperity. The safety and pedestrian improvements included in the LPA are expected to make the Mall more attractive and contribute positively to economic conditions in the overall downtown area.

There are five private developments adjacent to 16th Street that complement the public investment: Market Station Redevelopment, 1501 Tremont Place, Block 162, Tabor Center Tower Two, and 15th and Stout Hotel. Therefore, when combined with past, present, and reasonably foreseeable future projects, the LPA would have a beneficial long-term cumulative effect on economic conditions.

3.1.4.3 Locally Preferred Alternative Design Option

The LPA Design Option would result in the same impacts to economic resources as the LPA, with the exceptions described in the following paragraphs.

On the asymmetrical blocks, the LPA would more equally distribute the benefits of public use to adjacent businesses and property owners than the No Build Alternative because the LPA would provide trees, lights, and amenity zones with furnishings on both sides of asymmetrical blocks, improving public use and activation on the narrow sides. 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 than the No Build Alternative.

The LPA Design Option would result in reduced opportunity for public use on the narrow side of the asymmetrical blocks than the LPA, impacting businesses and property owners: the reduced 7-foot patio/gathering space width (versus 9 feet in the LPA) would remove 30 percent of outdoor table seating (which has been demonstrated to be the most activating space for public use) and reduce 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. Although some of the current building uses along the LPA Design Option's asymmetrical blocks would 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, and not to respond to specific buildings and land uses on individual blocks.

Sales tax revenue would be less for the LPA Design Option than the LPA because patio spaces would be reduced on the asymmetrical blocks; the loss of sales tax revenue would have a direct effect on the revenues the BID collects to maintain downtown infrastructure, including the Mall.

3.1.5 Mitigation

A general performance specification will be developed outlining general goals and guidelines for the maintenance of access to businesses and transit operations on the Mall during construction. CCD will ensure the construction contractor adheres to CCD ordinance and standards for maintaining access to adjacent properties during construction.

CCD, in coordination with RTD, DDP, and the contractor, with input from businesses adjacent to the Project limits, will develop and implement a PMP. The PMP will include, but is not limited to, the following measures:

- Access: Provide references to applicable information in the TMP to maintain reasonable access to businesses and pedestrians during all phases of construction of the LPA; maintain reasonable access for cross traffic and bicycle lanes, except for limited intermittent closures, as well as reasonable access for other connecting transit service; and Free MallRide transit service maintenance. During subsequent design phases, form a Business Impacts Working Group to discuss impacts and construction phasing.
- Communication: Communicate regularly with businesses and property owners about the construction schedule.
- Additional Signage: Coordinate with DDP to develop signage that directs visitors to businesses during construction. Some of the businesses may benefit from additional signage because of reduced visibility due to construction activities.
- Regional Outreach: Conduct public outreach to let the local community and region know that the area is open for business during construction. As Downtown Denver is a regional destination, it will be important to communicate construction schedules and special events to the region and even statewide.
- Special Events / Marketing: Coordinate additional outreach, special events, and extra marketing with local businesses. These will be particularly important to ensure that visitors and employees know that Downtown Denver and specific businesses remain open for business during periods of construction.
- Additional Mitigation: Participate with local business organizations, under the leadership of DDP, to identify other measures the Project could incorporate to mitigate business impacts. Coordinate and continue to work closely with these organizations on specialized outreach, special sales, and extra marketing, in addition to developing a Project-specific outreach and marketing campaign and other measures to reduce business impacts.

The CCD will ensure the contractor implements the PIP, which will include the following outreach strategies:

- Issue construction updates and post them on the Project website.
- Provide advance notice of roadway closures, driveway closures, and utility shutoffs.
- Conduct public meetings.
- A public information line of communication will be established and available to field public comments and complaints during construction.

- Prepare materials with information about construction.
- Address property access issues.
- Assign staff to serve as liaisons between the public and contractors during construction.

Table 3-2 shows the LPA's anticipated impacts to economic conditions, and their potential mitigation. The LPA Design Option would not have adverse effects that would require mitigation beyond what is described for the LPA.

Table 3-2. Summary of Adverse Impacts and Mitigation Commitments for the LPA: Economic Conditions

Impacts	Mitigation
Direct Impacts • No adverse impacts. Indirect Impacts • No adverse impacts. Temporary Construction Impacts • Temporary impacts to the approximate 370 businesses adjacent to the Project limits. Temporary effects could include disruption of pedestrian flow, noise and restricted or changed access. • Potential temporary decline in sales of 20 to 40 percent. • Potential temporary decline in sales tax revenue to CCD and RTD.	Direct Impacts • No mitigation required. Indirect Impacts • No mitigation required. Temporary Construction Impacts • CCD will ensure the construction contractor adheres to CCD ordinance and standards for maintaining access to adjacent properties during construction. • CCD, in coordination with RTD, DDP and the contractor, with input from businesses adjacent to the Project limits, will develop and implement a PMP. The PMP will include, but is not limited to, the following measures: – Access: Provide references to applicable information in the TMP to maintain reasonable access to businesses and pedestrians during all phases of construction of the LPA; maintain reasonable access for cross traffic and bicycle lanes, except for limited intermittent closures, as well as reasonable access for other connecting transit service; and Free MallRide transit service maintenance. During subsequent design phases, form a Business Impacts Working Group to discuss impacts and construction phasing. – Communication: Communicate regularly with businesses and property owners about the construction schedule. – Additional Signage: Coordinate with DDP to develop signage that directs visitors to businesses during construction. Some of the businesses may benefit from additional signage because of reduced visibility due to construction activities.

Impacts	Mitigation
	– Regional Outreach: Conduct public outreach to let the local community and region know that the area is open for business during construction. As Downtown Denver is a regional destination, it will be important to communicate construction schedules and special events to the region and even statewide. – Special Events / Marketing: Coordinate additional outreach, special events, and extra marketing with local businesses. These would be particularly important to ensure that visitors and employees know that Downtown Denver and specific businesses remain open for business during periods of construction. – Additional Mitigation: Participate with local business organizations, under the leadership of DDP, to identify other measures the Project could incorporate to mitigate business impacts. Coordinate and continue to work closely with these organizations on specialized outreach, special sales, and extra marketing, in addition to developing a Project-specific outreach and marketing campaign and other measures to reduce business impacts. • The PMP will include the PIP. Outreach strategies in the PIP will include the following: – Issue construction updates and post them on the Project website. – Provide advance notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings. – A public information line of communication will be established and available to field public comments and complaints during construction. – Prepare materials with information about construction. – Address property access issues. – Assign staff to serve as liaisons between the public and contractors during construction. • Construction will be phased to limit the construction timeline in front of single properties.

3.2 Cultural Resources

3.2.1 Laws, Regulations, and Orders

The term 'cultural resources' includes buildings, sites, structures, landscapes, and archaeological and Native American sites and artifacts.

Many statutes and regulations protect cultural resources and are considered during the NEPA process and documented in an EA or an Environmental Impact Statement. The NHPA (54 United States Code [U.S.C.] Section 300101) defines historic properties as any prehistoric or historic district, site, building, structure, or object listed in or eligible for listing in the National Register of Historic Places (NRHP). Section 106 regulations (36 CFR Section 800) require federal agencies to consider the effects of proposed projects, activities, or programs funded in whole or in part with federal funds on historic properties and to provide the Advisory Council on Historic Preservation (ACHP) and/or the Colorado State Historic Preservation Officer (SHPO) with a reasonable opportunity to comment on any undertaking that would adversely affect properties listed in or eligible for listing in the NRHP. The ACHP responded to FTA on July 30, 2018 that they would like to participate in the resolution of adverse effects for this Project.

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. Integrity 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:

a. Association with events that have made a significant contribution to the broad patterns of our history.

b. Association with the lives of persons significant in our past.

c. Embodiment of the distinctive characteristics of a type, period, or method of construction or representative of the work of a master, or possessing high artistic value, or representative of a significant and distinguishable entity whose components may lack individual distinction.

d. Yielding, or likely to yield, information important in prehistory or history.

Historic significance is the importance of a property to a community, state, or the nation. In addition to the previously described criteria, significance is defined by the area of history in which the property made important contributions and by the period of time during which these contributions occurred.

For transportation projects that could impact cultural resources, Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 U.S.C. Section 303), implemented by 23 CFR 774, also protects historic resources. Section 4(f) applies to all projects that require approval by an agency of the U.S. Department of Transportation (DOT). Section 4(f) resources include any publicly owned park, recreation area, wildlife refuge, or publicly- or privately-owned historic

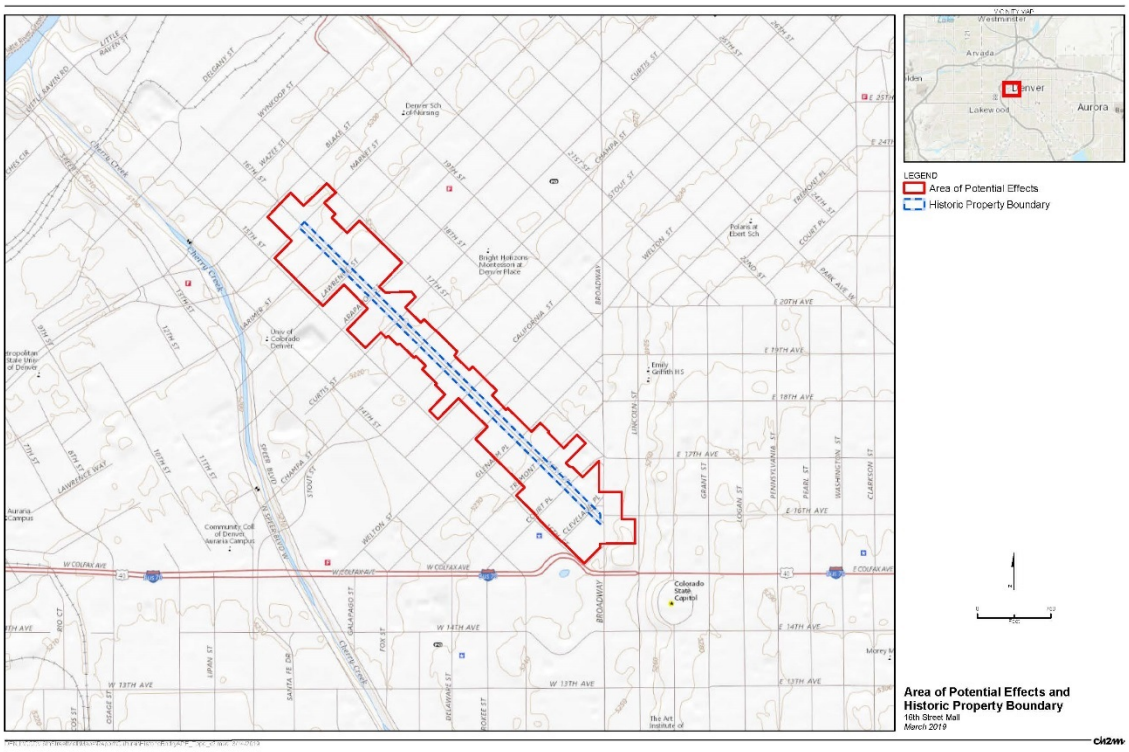
site. The Section 4(f) evaluation for the Project is contained in the *16th Street Mall Draft Section 4(f) Evaluation* (FTA, 2019).

A detailed *Cultural Resources Technical Report* (included in **Appendix B**) was prepared as part of the Section 106 consultation process; material in this section was largely extracted from that report. The report includes more detailed information on the impacts from the LPA, the avoidance and minimization measures taken, and the Section 106 Consultation process. The report was submitted to the SHPO and the consulting parties in May 2018 for review and comment. SHPO comments were received on June 5, 2018. Comments were discussed at subsequent consulting parties meetings, and an FTA response letter was sent March 14, 2019. Correspondence is included in **Appendix D**.

3.2.1.1 Area of Potential Effects

The Area of Potential Effects (APE) for the Project was established in consultation with the Colorado SHPO (which is housed in the Office of Archaeology and Historic Preservation [OAHP]) and the consulting parties starting in spring 2017. An APE is the area where the direct and indirect effects of a project may cause alterations in the character of historic properties. The APE for this Project includes the Mall from Market to Broadway and one parcel on each side of the corridor (**Figure 3-1**). The consulting parties (**Section 5.3**) and the SHPO commented on the APE during the first three consulting party meetings between July and September 2017; these comments have been captured in the meeting notes, which are included in **Appendix D**.

Figure 3-1. Area of Potential Effects and Boundary of the 16th Street Mall Property



3.2.2 Methodology

A review of previous studies and nominations, maps, aerial photographs, and historical photographs provided an understanding of the history of the Mall. Because the entirety of the Mall had been previously surveyed, no additional field investigations were conducted. Although the majority of the structures adjacent to the Mall have been previously surveyed, some of those surveys were completed in the 1980s and 1990s. RTD met with the SHPO in January 2018 to discuss how to treat the properties within the APE that would 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

The SHPO concurred with this approach and, for the purposes of this Project, the properties that meet these criteria are being considered NRHP-eligible for the effects analysis and determination. The *Cultural Resources Technical Report* in **Appendix B** of the EA contains detailed information about the NRHP-listed and -eligible properties within the APE.

The ACHP has developed regulations and guidance for federal agencies on how to assess effects to historic properties. As defined in the NHPA Section 106 regulations, an effect is "an alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the NRHP" (36 CFR 800.16). Criteria for adverse effects and examples are provided in the ACHP regulations (36 CFR 800.5). In this section, 'Project impacts' and 'Project effects' are used interchangeably.

Effects to cultural resources are defined in the following ways:

- **No Historic Properties Affected:** Either no historic properties are present, or those present would not be affected by the Project.
- **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 as outlined in 36 CFR 800.5, or when conditions are imposed to avoid adverse effects.
- **Adverse Effect:** There is an effect, and that effect diminishes the qualities of significance that qualify the property for inclusion in the NRHP.

Impacts to historic properties may be direct or indirect. To evaluate a project's potential direct or indirect effects, the current condition, location, and setting of cultural resources within the project area are evaluated. The planned activities are assessed to determine the likely effect of those activities on the cultural resources and on the qualities that make them eligible for listing in the NRHP.

3.2.3 Existing Conditions

Thirty-two historic properties have been identified within the Project APE, one of which is the 16th Street Mall itself. The 16th Street Mall Architectural Inventory Form 1403 (OAHP, 2018), in Attachment 2 of the *Cultural Resources Technical Report* in **Appendix B**, contains more detailed information. Attachment 4 of the *Cultural Resources Technical Report* in **Appendix B** contains a

map book showing the locations of the historic properties within the APE, and Attachment 5 contains an expanded table with additional information on each property.[2]

There is an identified historic archaeological site partially within the APE: Site 5DV.9217.1, a former tramway line that 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 Criteria 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; the site 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.

This section discusses the only property that will be directly impacted by the Project, the 16th Street Mall (OAHP property # 5DV.7044). **Table 3-3** lists the historic properties within the Project APE and their NRHP eligibility status.

Table 3-3. Historic Properties within Area of Potential Effects

OAHP ID No.	Historic Property Name	Address	NRHP Eligibility
5DV.47	Lower Downtown Historic District	Multiple	NRHP-eligible
5DV.47.15	Waters Building – Market Center	1642 - 1644 Market Street	Contributes to Lower Downtown Historic District
5DV.47.37	Hitchings Block	1620 Market Street	Contributes to Lower Downtown Historic District
5DV.47.7	Liebhardt-Linder Building – Market Center	1624 Market Street	Contributes to Lower Downtown Historic District
5DV.47.96	McCrary Block – Market Center	1628 Market Street	Contributes to Lower Downtown Historic District
5DV.500	Steel Building; Fontius Building; Sage Building	1555 Welton; 600 16th Street	Listed on NRHP
5DV.5297	Liebhardt Building; Cottrell Clothing Company	601 16th Street	Listed on NRHP
5DV.118	Daniels & Fisher Tower	1101 16th Street; 1601 Arapahoe Street	Listed on NRHP
5DV.135	Denver Dry Goods Company Building	702 16th Street; California Street; and 16th Street	Listed on NRHP

[2] Since completion of the *Cultural Resources Technical Report*, one historic property, the Madison Hotel, was discovered to have been demolished. The archaeological site is included in Attachment 5 but is not included in the Attachment 6 map book because specific locations of archaeological sites are confidential.

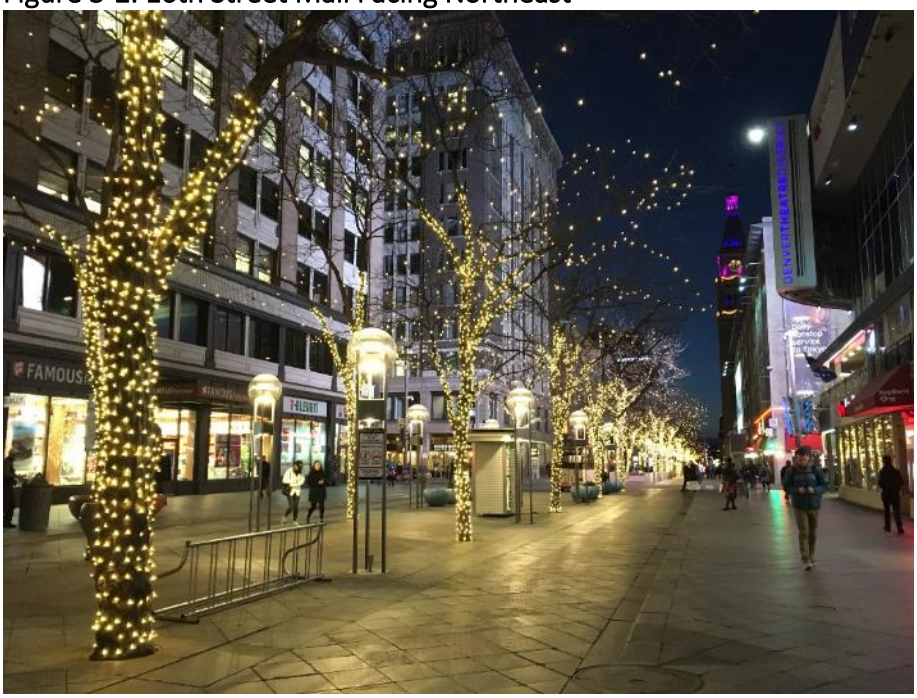
OAHP ID No.	Historic Property Name	Address	NRHP Eligibility
5DV.136	Masonic Temple Building	1614 Welton Street, 535 16th Street	Listed on NRHP
5DV.139	Kittredge Building	511 16th Street	Listed on NRHP
5DV.142	A.C. Foster Building; University Building	910-918 16th Street	Listed on NRHP
5DV.1913	Joslin Dry Goods Company Building; Tritch Building	934-938 16th Street	Listed on NRHP
5DV.494	A.T. Lewis and Son Department Store; Holtzman and Appel Block	800-816 16th Street	Listed on NRHP
5DV.496	Neusteter Building	720-726 16th Street	Listed on NRHP
5DV.499	McClintock Building	1554 California Street	Listed on NRHP
5DV.1725	Independence Plaza; Prudential Plaza	1001 16th Street 1050 17th St.	NRHP-eligible
5DV.1760	Bridgepoint Plaza; Park Central	1110 16th Street; 1515 Arapahoe Street; 1111 15th Street	NRHP-eligible
5DV.1832	Security Life Building; 1600 Glenarm Place	1616 Glenarm Place	NRHP-eligible
5DV.1854	Hilton Hotel; Radisson Hotel; Adams Mark Hotel	1550 Court Place	NRHP-eligible
5DV.1856	Dome Tower; Great West Plaza; World Trade Center	1625 Broadway	NRHP-eligible
5DV.1877	Zeckendorf Plaza; Hyperbolic Paraboloid	350 16th Street; 1550 Court Place	NRHP-eligible
5DV.1878	Colorado Federal Savings	200 16th Street	NRHP-eligible
5DV.1880	Petroleum Club Building; Petroleum Building; 110 Building	110 16th Street	NRHP-eligible
5DV.1914	Federal Reserve	1020 16th Street	NRHP-eligible
5DV.493	Symes Building; F.W. Woolworth Company	820 16th Street	NRHP-eligible
5DV.497	Hayden, Dickinson & Feldhauser Building; Colorado Building	1609-1615 California Street	NRHP-eligible
5DV.5298	Walgreens	801 16th Street	NRHP-eligible

OAHP ID No.	Historic Property Name	Address	NRHP Eligibility
5DV.7044	16th Street Mall	1-1300 16th Street	NRHP-eligible
5DV.8274	Skyline Park	1500-1800 Arapahoe Street	NRHP-eligible
5DV.842	16th Street Historic District	Multiple	NRHP-eligible
5.DV.9217.1	Denver Tramway Trolley Lines Archeological Site	Broadway	NRHP-eligible

3.2.3.1 16th Street Mall

The 16th Street Mall (OAHP#5DV.7044) (**Figure 3-2**) was determined eligible for listing in the NRHP in 2013, but the Architectural Inventory Form (OAHP Form 1403) was not completed at that time. This form was submitted by FTA to the SHPO in May 2018 for concurrence on the character-defining features of the property and the supporting documentation. FTA received formal concurrence of the 16th Street Mall's eligibility in a letter from SHPO dated June 20, 2018.

Figure 3-2. 16th Street Mall Facing Northeast



Source: Jacobs (Photograph taken January 12, 2018)

The 16th Street Mall is eligible for listing in the NRHP under Criteria A and C at the local and state levels, with a period of significance from 1980 to 1982, spanning its design and construction. It is eligible under Criterion A in the areas of Transportation and Community Planning and Development for its impact on the growth of downtown Denver and the development it spurred. It is also significant under Criterion C in the area of 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. The 16th Street Mall also meets

NRHP eligibility Criterion Consideration G as a property that is identifiable as historically significant at less than 50 years old.

It is an example of a design at the intersection of the post-World War II Modern Movement—geometric shapes and space-age light fixtures—and later-20th-century Post-Modern design. The creators of the design used an organic pattern that evokes elements of diamondback rattlesnake skin and Navajo blankets, both grounded in Denver's western identity (OAHP, 2018). The Mall is also significant under NRHP Criterion C in the area of engineering for the largely hidden but sophisticated and complex matrix of drainage, irrigation, wiring, and for the suspended pavement system that accommodates large and deep root chambers for the shade trees included in the design (OAHP, 2018).

The 16th Street Mall historic property is an 80-foot-wide linear transportation facility that includes 12.5 blocks of 16th Street from Broadway at its western line of intersection with 16th Street (including the small triangular block bounded by Broadway, 16th Street, and Cleveland Place) to Market Street at its eastern line of intersection with 16th Street (**Figure 3-1**). This boundary encompasses the original design limits of the 1980 transit way and Mall design by I.M. Pei & Partners and Hanna/Olin landscape architects.

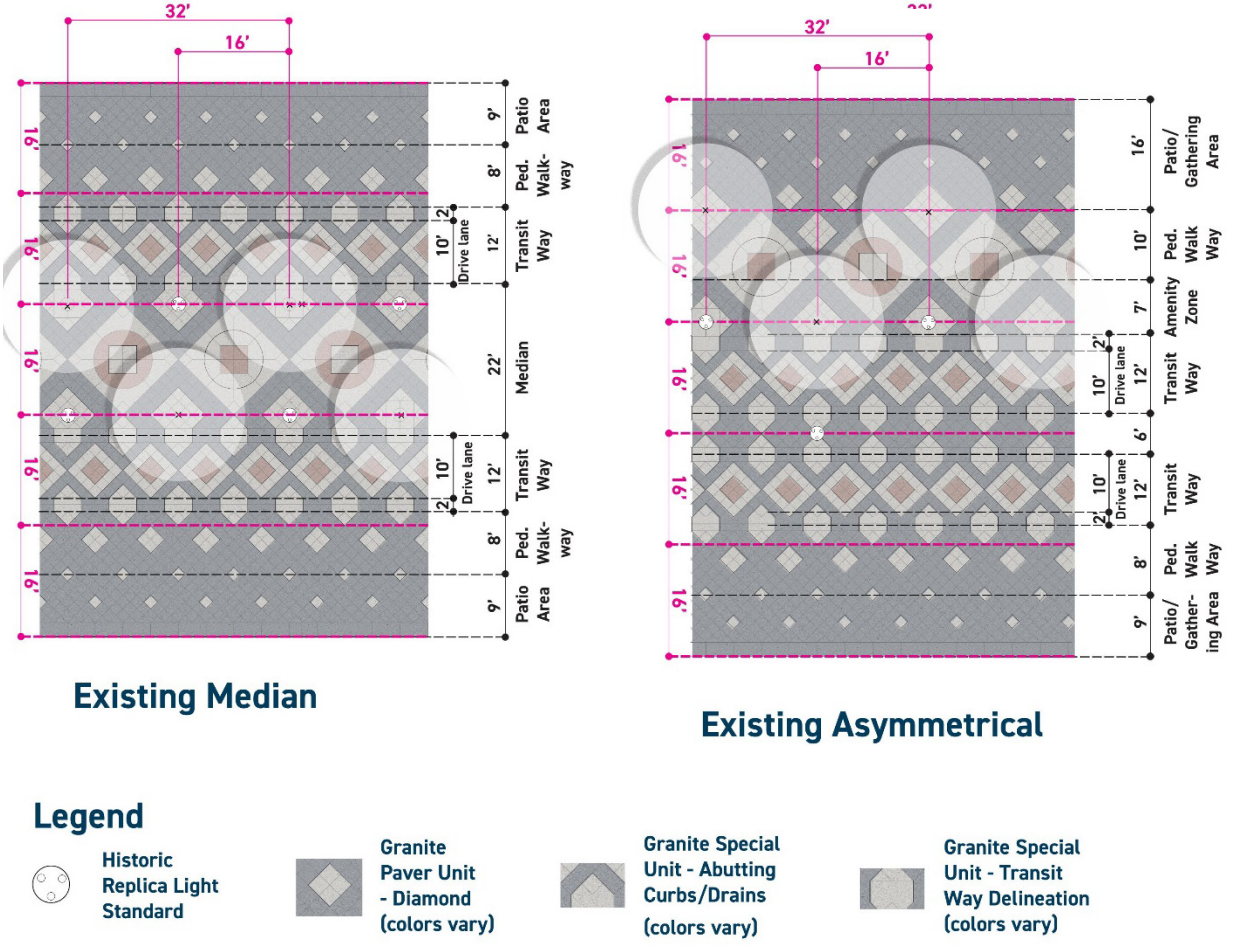
The property has three distinct zones, or "rooms": a central room with a 22-foot-wide median with two parallel rows of trees, and end rooms where the transit ways are adjacent to two parallel rows of trees on the north side. The center room has symmetrically allocated spaces, and the end zones have asymmetrically allocated spaces with a wider pedestrian area on the north side of the blocks. The essential elements of the design, according to the 1977 design concept document, are "paving, planting, and lighting" (I.M. Pei & Partners, 1977). The design—precisely interwoven granite pavers in three colors and unified by the tree plantings and light standards—considered the existing scale of the street with its variety of visual elements and buildings sizes and uses. According to the I.M. Pei–Hanna/Olin plan, "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). Custom-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 to blend with the rest of the Mall's design features (OAHP, 2018).

The pavement 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 (curbs) today measures between 3 and 4 inches at the edge of the transit ways along the length of the Mall.

The existing design and pattern of the symmetrical median 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 of the Mall (**Figure 3-3**). Within the center room of symmetrical blocks, older buildings (late-19th- and early-20th-century) line the Mall. At

the edges of the 80-foot pavement, a narrow concrete apron of varying widths sits between the building faces and 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 (the depression) 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 of the median.

Figure 3-3. Existing Median and Asymmetrical Block Pavement Patterns



The existing design and pattern of the asymmetrical blocks also comprise five 16-foot-wide pattern sections, illustrated on **Figure 3-3**. The sections of the pattern are almost the same as in the median blocks, but two of the 16-foot-wide pattern sections are swapped, so that the large diamond pattern is next to the small diamonds of the pedestrian area on the north side of the block, and the medium-sized diamond pattern moves to the middle of the block, next to the southernmost medium-sized diamond pattern, to create the asymmetrical section and follow the programming of the street (transit way and wider pedestrian areas on the north side). A concrete apron of varying widths sits between the building faces and the granite pavers, to accommodate variations in the locations of the more modern (mid-century and newer) building frontages of the asymmetrical blocks. At the outside edges of the transit ways, a 2-foot-wide linear strip of vertical curb separates the medium-sized diamond pattern of the transit ways from the adjacent patterns of the pedestrian areas. At the inside edges of the transit ways,

another 2-foot-wide linear strip of pan defines the edge of the transit ways from the center median with light standards.

The character-defining features of the Mall, as identified in Form 1403, are as follows:

- Consistent paving pattern design
- Granite paver units and 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
- Street furniture of custom-designed and custom-built fiberglass trash and flower receptacles
- Custom metal street signs on traffic signals and overhead lights

These features are retained on the Mall today. The light standards have been replicated and returned to their original locations and very few of the red oaks have survived, but the majority of the honey locust trees remain.

3.2.4 Impact Evaluation

3.2.4.1 No Build Alternative

The No Build Alternative would not change the spatial configuration of the Mall and would not repair or upgrade the pavement system or belowground utilities and infrastructure. The trees and tree boxes would not be replaced, tree health would continue to deteriorate, and trees would continue to die over time. Under the No Build Alternative, the granite pavers would continue to require repair and be replaced in an ad hoc manner as the need arose or replaced with concrete, asphalt, or other materials, and the frequent and costly maintenance would continue. Because the underlying existing deteriorating infrastructure would not be updated, the pavers would continue to become dislodged and damaged, presenting safety hazards for pedestrians and vehicles.

There would be no significant impact on the Mall under the No Build Alternative; however, there would be impacts from the continued increase in the loss of trees and granite pavers, as is currently the case, through ad hoc repair and replacement. The *Cultural Resources Technical Report* in **Appendix B** of the EA explains in greater detail the impacts from the No Build Alternative.

3.2.4.2 Locally Preferred Alternative

Short-term Direct and Indirect Construction Impacts

Archaeological Resources

One archaeological site has been identified within the APE but is outside of the construction limits. No other archaeological sites have been identified within the APE or limits of construction. Although the same area was disturbed in the 1980s to build the Mall, and no

archaeological sites were encountered during the original construction, there is still a chance archaeological resources could be discovered during construction.

Historic Properties that Abut the Project Limits

Historic buildings that abut the Mall would be temporarily affected during construction of the LPA. The historic setting and feeling of these buildings would be affected by construction activities. Transit service would be shifted or moved off the Mall, pedestrian activity would be reduced, trees would be removed, and the street would be excavated to repair and replace the infrastructure. These effects would occur only during the construction period.

Potential effects from vibration during construction have been considered for the historic properties lining the Mall. The majority of the historic properties adjacent to the Mall are built of masonry and pre-date the construction of the Mall. Activities from the Mall's original construction did not adversely affect these properties, and construction activities and machinery used during this reconstruction project are expected to have similar vibration effects and not expected to damage historic properties.

FTA's *Transit Noise and Vibration Impact Assessment Manual* (2018) identifies thresholds for potential annoyance from construction equipment vibration. Based on the type of equipment and the interference of vibration-sensitive buildings, the FTA criteria for a substantial vibration impact during construction would not be exceeded. The FTA guidance also provides a damage threshold for building types and vibration sources. This Project is not anticipated to use pile driving equipment, a clam shovel drop, or hydromill equipment. Anticipated equipment to be used include: hoe ram, large and small bulldozers, jack hammers, and loaded trucks. Based on the type of equipment anticipated to be used during construction, the FTA criteria for engineered concrete and masonry buildings and non-engineered timber and masonry buildings (the primary building types adjacent to the Mall) would not be exceeded, and construction activities and machinery used in this reconstruction project are not expected to impact adjacent buildings, including historic properties. **Section 3.5.3** contains additional information on vibration impacts.

Potential temporary economic impacts to residences and businesses in the historic properties along the Mall have also been considered in this analysis. A description of construction activities is provided in **Section 2.4.4**. Temporary effects would include disruption of pedestrian flow, noise and restricted or changed access. Businesses with direct access to the Mall and cross streets could experience intermittent closures of their primary access on the Mall, but access would be maintained (albeit changed in some cases) for all properties for the duration of construction. A general performance specification will be developed outlining general goals and guidelines for the maintenance of access to buildings, including historic properties, on the Mall during construction. CCD, in coordination with RTD, DDP, and the contractor, with input from businesses adjacent to the Project limits, will develop and implement a PMP (**Section 3.1** contains additional information on economic impacts).

Circulation through the 16th Street Historic District would be changed, and access to some of the buildings within the district would be temporarily impacted during construction. The setting and feeling of the district would be impacted during construction, but the setting would be restored after construction. The proposed LPA design continues the relationship of the Mall to the historic buildings along the Mall with the asymmetrical and symmetrical rooms of the Mall.

Only a small portion of the Lower Downtown Historic District is within the limits of construction, but the block of the Mall between Market and Larimer Streets, within the district, would be temporarily impacted during construction. The district has many other circulation options, so the impacts to the district as a whole would be limited. There would be a minor impact to the setting of this southeast corner of the district, but there would be minimal impacts to the setting or feeling of the district, when considering the entirety of the district.

16th Street Mall Historic Property

Impacts to the 16th Street Mall historic property would be considered long-term impacts; short-term impacts would be the same as the long-term impacts to the property.

Long-term Direct and Indirect Impacts

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 limits of construction. 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 LPA because it is outside the limits of construction. For archaeological resources, there would be No Historic Properties Affected.

No previously recorded significant archaeological resources have been identified within the Project limits (**Figure 1-1 [Page 1-2]**). The Project footprint was previously disturbed during the construction of the Mall in the early 1980s, 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.

Historic Properties that Abut the Project Limits

There would be no property acquisitions of the buildings adjacent to the Mall that are within the APE. The Project would occur only in existing transportation right-of-way. As a result, there would be no long-term direct impacts to these properties. A more detailed discussion of these historic properties is provided in the *Cultural Resources Technical Report* in **Appendix B**.

Under the LPA, the transit way alignment would shift 11 feet farther away from the buildings on the symmetrical blocks (Arapahoe Street to Tremont Place). On the asymmetrical blocks from Arapahoe to Market Streets and Tremont to Cleveland Place, the transit way would shift 7 feet farther away from the building face on the southern (narrow) side of the Mall, and 1 foot closer to the building face on the northern (wide) side of the Mall. For the eastern half-block from Cleveland Place to Broadway, the transit way would not shift. The changes in the Mall from the shift in transit way alignment would change the setting of the adjacent buildings but because the Mall would remain a busy transit and pedestrian corridor with a similar design concept, the effect would be minimal.

There would be no property acquisitions from the two historic districts that intersect with the Project (Lower Downtown Historic District and the 16th Street Historic District), occurring in the existing transportation right-of-way. However, the historic districts could have some temporary impacts from construction of the LPA as previously described.

Visual Effects

The majority of the historic properties within the APE, adjacent to the Mall, are early to mid-20th-century buildings and have an earlier period of significance than the Mall. Because a visual change to these properties occurred in the 1980s when the Mall was installed, their original viewsheds of a traditional city street were removed and altered in the 1980s. This Project will not restore that original viewshed. There would be alterations to the existing viewshed from the historic properties lining the Mall. While perceptible, the project's effect would not substantially change the setting or feeling of the Mall because the Mall would continue to operate as a transit and pedestrian facility. The change in programming and realignment of the transit way, introduction of new tree species, and addition of new trees and lights would change the viewshed from ground level and from the floors above. The design commitments to honor the original design concepts and materials minimize this effect. The greatest visual impact would be during construction, when the views from the historic buildings would be of construction materials, rather than of an active pedestrian and transit area. Aside from the addition of smaller trees, the setting would be generally restored after construction is completed.

Vibration

According to the FTA *Transit Noise and Vibration Impact Assessment Manual* (2018*)*, vibration impacts are unlikely for transportation projects that operate rubber-tired vehicles, except in unusual situations. The Free MallRide shuttles have rubber tires, and there are no unusual aspects of this Project, such as roadway surface unevenness or speed bumps. The Free MallRide shuttles do not operate inside or directly underneath any buildings; as a result, no long-term vibration is likely from operation of the Free MallRide shuttles under the LPA.

16th Street Mall Historic Property

There would be a long-term impact and an adverse effect on the 16th Street Mall historic property from implementation of the LPA. Impacts to the Mall would include realignment and relocation of the transit ways, reallocation of pedestrian and public use programming, replacement and relocation of trees, introduction of additional tree species, and replacement of the existing granite pavers with new granite pavers. Existing and moveable street features (for example, benches, planters, and trash receptacles) would likely not be retained.

Design Concept and Materials

Although the LPA would honor and complement the original I.M. Pei–Hanna/Olin design, it would not replicate it in every detail. The design concept of asymmetrically designed end blocks and symmetrically designed center blocks would be retained. The symmetrical blocks would 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 asymmetrical blocks at each end reflect the more recent mid-century and newer buildings in the end zones.

The design concept of linear rows of trees and lights along the length of the Mall would be retained. The replacement of failing infrastructure and reallocation of space and functions along the Mall would impact the original design by 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. On the asymmetrical blocks, the rows of trees would occupy the same place

within the pattern (in the medium-sized, light-gray-colored diamonds). The custom-designed tree boxes would be removed and replaced with a new system described in **Section 2.4.1.3**.

Important elements of historic materials would also be reflected in the LPA design, including granite pavers, signs, replica lights, and potentially representative elements of original street furniture and fountains.

The tree species would change but new trees would be included based on the historic design criteria. 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 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 on the narrow side of the asymmetrical blocks would be added, replica pole light standards would also be added, in keeping with the original linear rows of staggered trees and lights.

Pavement Material and Pattern

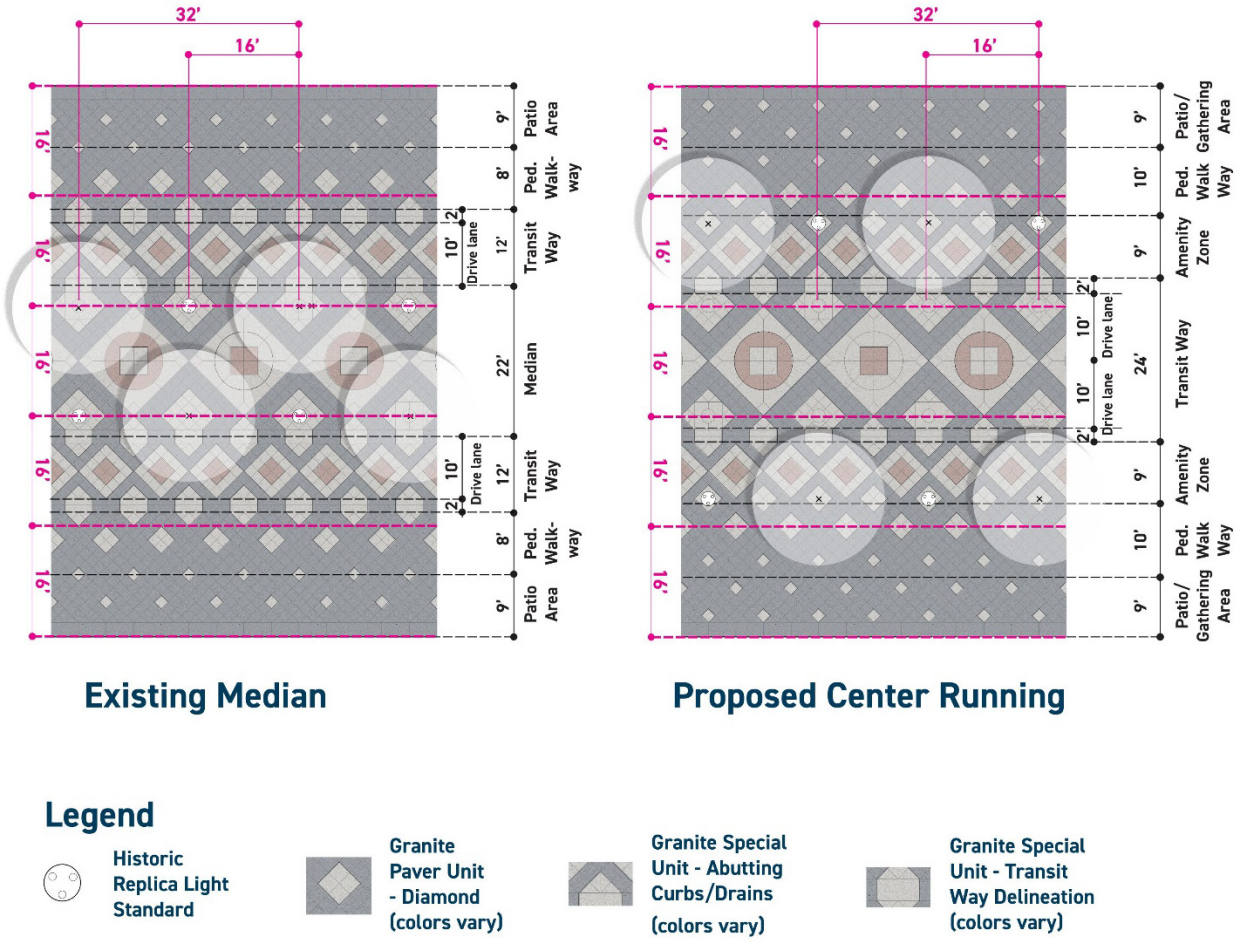
The granite pavers would be rebuilt with new granite pavers. The goal is to retain the pattern geometry, spatial relationships, massing, size, scale, and color where possible, changing these only if it is necessary to meet functionality, operations, safety, and regulations. The iconic paver pattern has been essentially replicated on the symmetrical blocks in the center-running design, and largely replicated on the asymmetrical blocks in the new asymmetrical design, as described in the following paragraphs.

Symmetrical blocks

As a result of the symmetry of the pattern in the symmetrical blocks, the LPA can largely maintain the granite paver pattern of the Mall's iconic pavement carpet despite the changes in uses of the spaces. **Figure 3-4** illustrates the symmetrical block pavement pattern for the existing and proposed designs of the Mall's center blocks (between Arapahoe Street and Tremont Place).

Under the proposed center-running block design, 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 3-4**). 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 (new) amenity zone and shift the outside small diamond pattern 2 feet toward the center of the Mall (**Figure 3-4**). 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.

Figure 3-4. Existing and Proposed Symmetrical Block Design



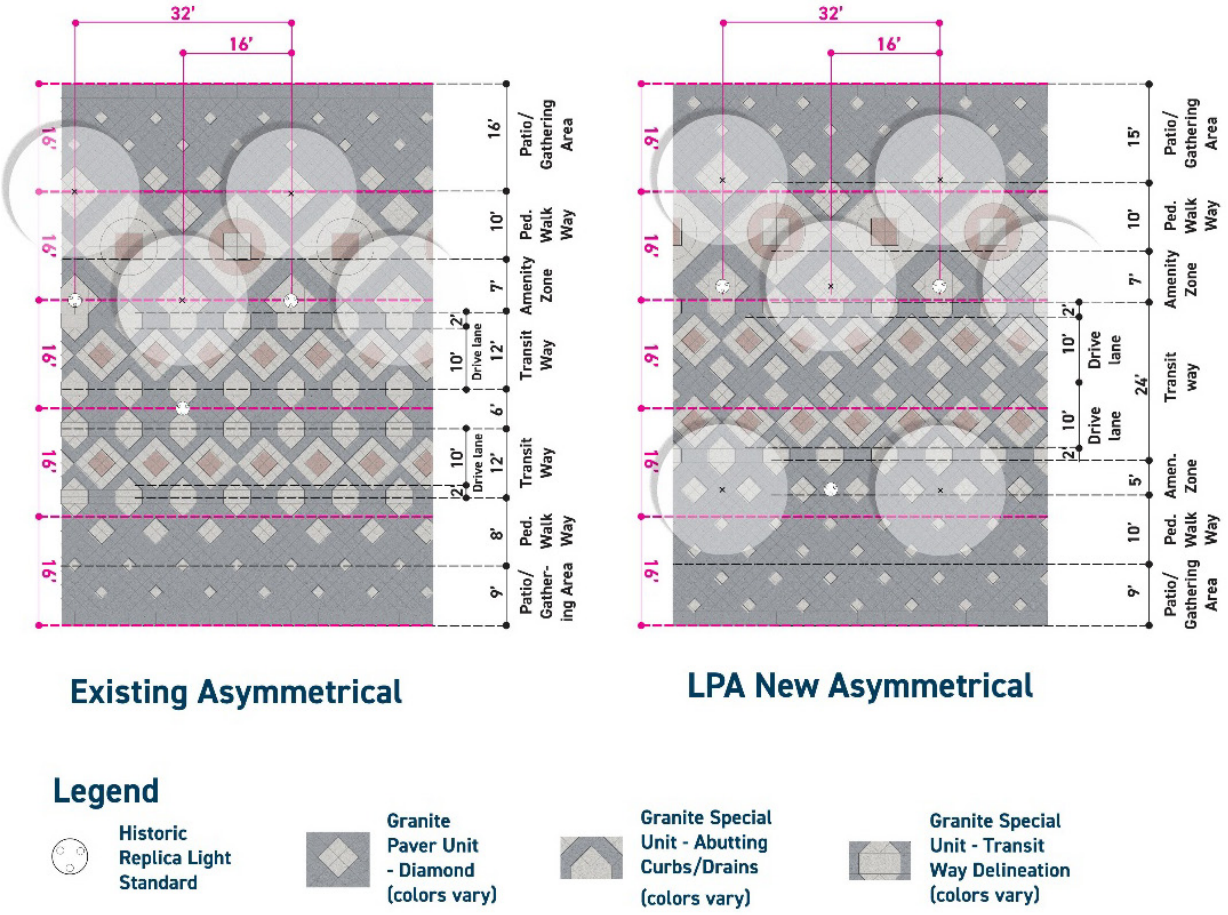
Although the paver pattern on the symmetrical blocks would be retained with the new center-running transit cross-section, changing the programming changes how the activities on the Mall correspond to the pattern. In the existing design, the paving pattern of large diamonds defines the pedestrian promenade 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 voiced preference for maintaining the physical elements of the pavement design (rather than maintaining the programming relationships) as an important measure to minimize adverse effects to the historic property.

Asymmetrical blocks

The reconfiguration of space on the asymmetrical blocks would 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 effects of these spatial shifts on the paver pattern is shown on **Figure 3-5**. The larger diamond patterns with the red granite pavers are retained (but shifted). The small black granite grid pattern on the edges 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 3-5**).

Figure 3-5. Comparison of the Paver Pattern in the Existing and LPA Asymmetrical Block 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.

Visual Effects

The changes to the character-defining features of the Mall from the LPA would have corresponding visual effects consistent with the described design changes. From a visual perspective, the changes would be less perceptible because the materials and overall design concept, location of transitions between symmetrical and asymmetrical sections, and alignment of trees would be maintained. However, the new, smaller trees would result in a more perceptible visual change because until the new trees reach maturity, one of the main visual

elements of the Mall would be altered. The replacement trees will be smaller initially, so the existing canopy will take some years to regrow, giving the Mall a different visual aspect in the interim. The smaller trees would be similar to the sizes of the trees of the historic period of significance of the Mall's initial construction, which matured over time to the canopy envisioned by the designers.

Curbs

One of the character-defining features of the Mall is the special units of charcoal and light gray granite pavers used for the curbs and pans at the edges of the transit way. On the outside edges of the transit way, the curbs are vertical, and between the transit lanes, a pan section is used (**Figure 2-3 [Page 2-8]**). The LPA would maintain these units in the pattern but change their locations to correspond to the edges of the new transit way alignment. **Figure 2-3 (Page 2-8)** shows the existing vertical curb and pan.

Under the LPA, in the symmetrical blocks the special units would be removed from their existing locations at the edges of the existing transit way because of the transit way relocation. Additionally, on the symmetrical blocks, the special units at the inner edges of the existing transit lanes would align with the outer edges of the proposed transit lanes, so those special units would be rebuilt in place.

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 retain the same dimensions and colors of the rectangular granite units in the existing design.

Additional design elements proposed to provide edge delineation are a textured strip between the transit way and amenity zone, truncated domes (textured ground surface indicators) at designated transit way and roadway crossings, consideration of truncated domes at designated shuttle stops, an optional directional indicator within the pedestrian walkway, an amenity zone with fixed furnishings, and a transit lane indicator. These elements are illustrated on **Figure 2-6 (Page 2-13)**. Although pedestrians can cross the transit way at any point along the Mall, designated crossings occur at cross streets and at the ends of each block.

The textured delineation at the edge of the curb or pan unit is planned to be fabricated on the surface of the granite pavers so as not to adversely impact the pattern or materials. The other required common elements that would visually disrupt the historic pattern are the truncated domes at designated crossings and potentially at shuttle stops, and amenity zones with fixed furnishings. Outreach with the ADA/Disability Advisory Committee during a subsequent design phase will determine material and color selections for the truncated domes and directional indicators and provide input on the design and location of fixed furnishings. The directional indicator is optional.

The Section 106 consulting parties will have an opportunity to provide input on future design decisions affecting character-defining features of the Mall as outlined in the Programmatic Agreement.

Findings of Effect

Table 3-4 shows the findings of effect for each of the 32 historic properties within the APE, including: one Adverse Effect, thirty No Adverse Effect, and one No Historic Properties Affected.

FTA requested concurrence on these findings from SHPO in May 2018. SHPO concurred with these findings but expressed concerns regarding potential construction-related impacts including temporary vibration and continued access to the historic properties adjacent to the Mall (as previously discussed). The SHPO also requested additional information on alternatives to avoid or minimize the Adverse Effect to the 16th Street Mall; this analysis is contained in the *16th Street Mall Draft Section 4(f) Evaluation* (FTA, 2019).

Table 3-4. Findings of Effect on Historic Properties within the Area of Potential Effects

Site ID	Site Name	Address	NRHP Eligibility Status	Finding of Effect
5DV.118	Daniels & Fisher Tower	1101 16th Street; 1601 Arapahoe Street	Listed on NRHP	No Adverse Effect[a]
5DV.135	Denver Dry Goods Company Building	702 16th Street; California Street; and 16th Street	Listed on NRHP	No Adverse Effect[a]
5DV.136	Masonic Temple Building	1614 Welton Street, 535 16th Street	Listed on NRHP	No Adverse Effect[a]
5DV.139	Kittredge Building	511 16th Street	Listed on NRHP	No Adverse Effect[a]
5DV.142	A.C. Foster Building; University Building	910-918 16th Street	Listed on NRHP	No Adverse Effect[a]
5DV.1725	Independence Plaza Prudential Plaza	1001 16th St. 1050 17th St.	NRHP-eligible	No Adverse Effect[a]
5DV.1760	Bridgepoint Plaza; Park Central	1110 16th Street; 1515 Arapahoe Street; 1111 15th Street	NRHP-eligible	No Adverse Effect[a]
5DV.1832	Security Life Building; 1600 Glenarm Place	1616 Glenarm Place	NRHP-eligible	No Adverse Effect[a]
5DV.1854	Hilton Hotel; Radisson Hotel; Adams Mark Hotel	1550 Court Place	NRHP-eligible	No Adverse Effect[a]
5DV.1856	Dome Tower; Great West Plaza; World Trade Center	1625 Broadway	NRHP-eligible	No Adverse Effect[a]
5DV.1877	Zeckendorf Plaza; May D & F Plaza; Hyperbolic Paraboloid	350 16th Street; 1550 Court Place	NRHP-eligible	No Adverse Effect[a]
5DV.1878	Colorado Federal Savings	200 16th Street	NRHP-eligible	No Adverse Effect[a]

Site ID	Site Name	Address	NRHP Eligibility Status	Finding of Effect
5DV.1880	Petroleum Club Building; Petroleum Building; 110 Building	110 16th Street	NRHP-eligible	No Adverse Effect[a]
5DV.1913	Joslin Dry Goods Company Building; Tritch Building; Savoy Grille	934-938 16th Street	Listed on NRHP	No Adverse Effect[a]
5DV.1914	Federal Reserve	1020 16th Street	NRHP-eligible	No Adverse Effect[a]
5DV.47	Lower Downtown Denver Historic District	Multiple	NRHP-eligible	No Adverse Effect[a]
5DV.47.15	Waters Building - Market Center	1642 - 1644 Market Street	Contributes to Lower Downtown Historic District	No Adverse Effect[a]
5DV.47.37	Hitchings Block	1620 Market Street	Contributes to Lower Downtown Historic District	No Adverse Effect[a]
5DV.47.7	Liebhardt-Linder Building- Market Center	1624 Market Street	Contributes to Lower Downtown Historic District	No Adverse Effect[a]
5DV.47.96	McCrary Block - Market Center	1628 Market Street	Contributes to Lower Downtown Historic District	No Adverse Effect[a]
5DV.493	Symes Building; F.W. Woolworth Company	820 16th Street	NRHP-eligible	No Adverse Effect[a]
5DV.494	A.T. Lewis and Son Department Store; Holtzman and Appel Block	800-816 16th Street	Listed on NRHP	No Adverse Effect[a]
5DV.496	Neusteter Building	720-726 16th Street	Listed on NRHP	No Adverse Effect[a]
5DV.497	Hayden, Dickinson & Feldhauser Building; Colorado Building	1609-1615 California Street	NRHP-eligible	No Adverse Effect[a]
5DV.499	McClintock Building	1554 California Street	Listed on NRHP	No Adverse Effect[a]
5DV.500	Steel Building; Fontius Building; Sage Building	1555 Welton; 600 16th Street	Listed on NRHP	No Adverse Effect[a]

Site ID	Site Name	Address	NRHP Eligibility Status	Finding of Effect
5DV.5297	Liebhardt Building; Cottrell Clothing Company	601 16th Street	Listed on NRHP	No Adverse Effect[a]
5DV.5298	Walgreens	801 16th Street	NRHP-eligible	No Adverse Effect[a]
5DV.7044	16th Street Mall	1-1300 16th Street	NRHP-eligible	Adverse Effect
5DV.8274	Skyline Park	1500-1800 Arapahoe Street	NRHP-eligible	No Adverse Effect[a]
5DV.842	16th Street Historic District	Multiple	NRHP-eligible	No Adverse Effect[a]
5.DV.9217.1	Denver Tramway Trolley Lines archeological site	Broadway	NRHP-eligible	No Historic Property Affected

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

In summary, the LPA would have an Adverse Effect on the 16th Street Mall historic property because of alterations to the pavement pattern and materials, changes to tree species and locations, additional trees, additional light standards in the asymmetrical blocks, removal of the median in the center-running blocks, removal of the small median with the light standards in the asymmetrical blocks, changes to the transit way alignment, and removal of the belowground tree boxes and drainage system. The integrity of materials, design, and workmanship would be compromised by these changes. The association could remain, but the final product, while honoring the original design, would no longer be an I.M. Pei/Olin-designed landscape, and would lose its association with those designers. The Mall would retain integrity of setting, feeling, and location because the footprint would not change, the surrounding buildings would not change, asymmetrical and symmetrical block designs would be provided along the same center and end blocks, and it would continue to be a 12.5-block pedestrian and transit mall with rows of trees and lights. Important elements of historic materials would also be reflected in the LPA design, including 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.

Cumulative Impacts

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-20th-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.

There would be an Adverse Effect on historic properties from this Project that would contribute to the cumulative impact to cultural resources. However, it would not be a significant contribution because 16th Street will remain a pedestrian and transit corridor with the same relationship to the surrounding historic buildings and districts within the APE and beyond. Additionally, the minimization measures and design-based mitigation (such as using granite pavers; retaining trees in the design; retaining the three-room design concept with a beginning, middle, and end; and replicating the original pole lighting and tree alignment) reflect the historic design of the Mall and its role as an anchoring feature in Denver's downtown area.

3.2.4.3 Locally Preferred Alternative Design Option

As described in **Section 2.5.1**, the LPA Design Option is a variation on the LPA that was suggested by one of the Section 106 Consulting Parties as a potential opportunity to minimize adverse effects to the 16th Street Mall historic property. The LPA Design Option includes the same cross-section for the center symmetrical blocks but treats the five-and-a-half asymmetrical end blocks differently.

The LPA Design Option would also result in a long-term impact and an adverse effect on the 16th Street Mall historic property. The LPA Design Option would result in the same impacts to cultural resources as the LPA, with the exceptions described in the following paragraphs related to the differing treatment of the asymmetrical end blocks.

Design Concept and Materials

The LPA Design Option would retain the concept of asymmetrically designed end blocks and symmetrically designed center blocks composing 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 two asymmetrical rooms and increasing the size of the symmetrical room.

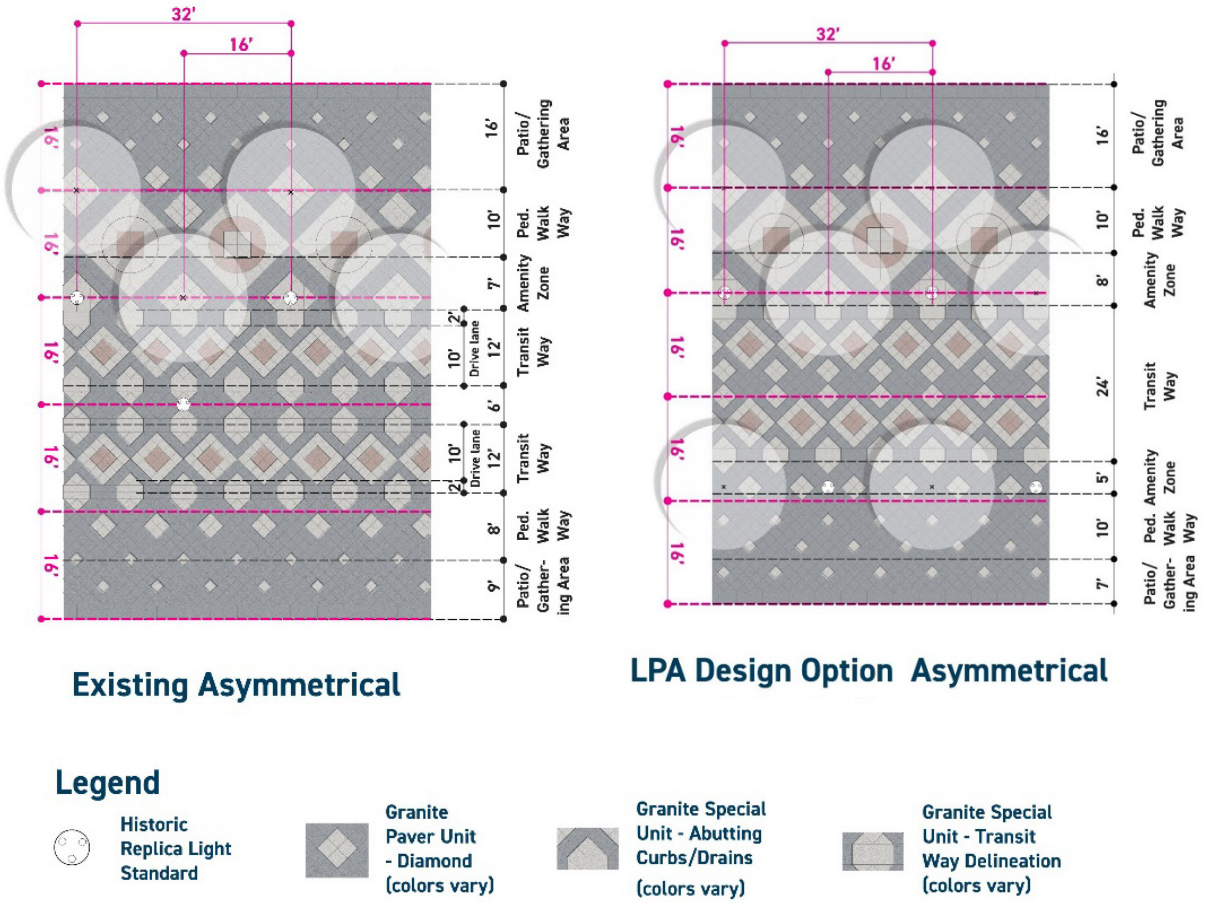
In plan view, the LPA Design Option would change the proportions of the original design, extending the symmetrical center-running section one block farther on each end of the Mall, creating two smaller end rooms and a larger central room (**Figure 2-7** [**Page 2-18**]). While the LPA Design Option does retain the three-room concept, changing the locations of the transitions at Arapahoe Street and Tremont Place changes the setting and feeling of the design concept. Skyline Park at Arapahoe Street and 16th Street was designed and built in the 1970s less than a decade before the 16th Street Mall design team started work on the Mall design. Skyline Park served as a visual break from the buildings along the pedestrian walkways of 16th Street and was an existing horizontal open space, making it an opportune location for a transition. The Daniels & Fisher Tower (5DV.118) had been identified in the early 1970s as a significant downtown property, and the transition from symmetrical to asymmetrical block design at Arapahoe Street highlights and accentuates that significance. The seven central blocks align with the older, early-20th-century buildings set directly on the edge of the pedestrian walkways without plazas or setbacks. This created 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 rooms flanking the larger, central room.

The relationship of the rooms within the context of downtown would be altered by the change in transition locations under the LPA Design Option. The feeling of the design of the Mall would be reduced by the change in transition locations because they would no longer align with the shifts from the early-20th-century canyon of low-rise buildings to the late-20th-century high rises with open places, plazas, and setbacks. The change in the transition locations affects the integrity of the setting for the relationships of the Mall to the adjacent buildings and uses.

Pavement Material and Pattern

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 the wide side of these blocks. 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 would be added, and patio/gathering spaces would be reduced 2 feet, from 9 feet to 7 feet. Additionally, the 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. The effects of these spatial shifts on the paver pattern is shown on **Figure 3-6**.

Figure 3-6. Comparison of the Paver Pattern in the Existing and LPA Design Option Asymmetrical Block Design



For the two existing asymmetrical 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.

Visual Effects

Visual effects on the 16th Street Mall historic property would differ from the LPA due to the change in transition location between symmetrical and asymmetrical blocks in relation to the adjacent building architectural styles and the non-aligned rows of trees between the symmetrical and asymmetrical blocks. The change in the relationship of the Mall to the surrounding buildings would have a greater visual effect to the setting than the LPA.

Summary

In summary, there would be an adverse effect to the 16th Street Mall historic property under the LPA Design Option for the same reasons as the under the LPA, from alterations to and from the pavement pattern and materials, tree species and locations, additional trees and lighting, removal of the median in the center-running blocks, removal of the small median with the light standards in the asymmetrical blocks, and changes to the alignment. The integrity of materials, design, and workmanship would be compromised through these changes. The association could remain, but the final product, while honoring the original design, would no longer be an I.M. Pei/Olin-designed landscape, and would lose its association with those designers. The LPA Design Option would rebuild in place portions of the design, but relocating the transitions, realigning the transit-way lanes, and eliminating the opportunity to have a single row of aligned trees along the length of the Mall would limit the overall association of the Mall with its original design concept. The Mall would retain integrity of location and feeling, as the overall footprint of 12.5 blocks in downtown Denver would not change, the surrounding buildings would not change, and it would continue to be a pedestrian and transit way mall. While the 12.5 blocks would not change, the relationship of the rooms within those blocks would change affecting the setting more than the LPA but not enough that the Mall would not continue to convey integrity of setting.

3.2.5 Avoidance, Minimization, and Mitigation Measures

3.2.5.1 Avoidance

A range of alternatives was evaluated by the project team throughout the planning process. None of the alternatives that meet the purpose and need would avoid an Adverse Effect on the 16th Street Mall. One other build alternative (the Center Running Alternative) is a feasible and prudent alternative but, like the LPA and LPA Design Option, would result in an Adverse Effect to the 16th Street Mall under Section 106 of the NHPA, and its effects are not mitigated as well and would result in greater impacts to the historic property.

Potential avoidance alternatives are discussed in detail in the *Draft 16th Street Mall Section 4(f) Evaluation* (FTA, 2019) and in the *Cultural Resources Technical Report* in **Appendix B** of the EA. They include a No Build Alternative, two different build alternatives, and a reduced-transit operations alternative. These alternatives were evaluated to determine if they provided

reasonable and feasible alternatives to meeting Project needs without use of the 16th Street Mall historic property.

3.2.5.2 Minimization and Mitigation

FTA and the Project Partners developed mitigation measures in consultation with consulting parties at meetings in June, November, and December 2018. Through the consultation process, FTA developed a draft Programmatic Agreement that stipulates the specific measures to be taken to address the adverse effect as well as a process for ongoing consultation for effects to character-defining historic features of the Mall as the design progresses. The Draft Programmatic Agreement is attached in **Appendix G**.

Consulting parties have strongly recommended design-based mitigations to address the adverse effect, as well as continued consultation on design elements related to the identified character-defining features of the historic property as construction ensues.

Throughout the design process, the Project Partners have recognized the importance of the Mall to the historic community and to the city. Efforts have been made to reduce impacts to the historic property, while still meeting Project purpose and need. Based on consultation with the Section 106 consulting parties, the design team has altered the design to address consulting party concerns regarding impacts to the historic property.

The LPA and LPA Design Option would reduce impacts to the character-defining features of the 16th Street Mall with the following design commitments:

- 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 transit way.
- Maintain spatial relationship between trees and light standards.
- Retain a granite paver surface in the same three colors as the original design.
- Retain permeability of pedestrians throughout each block
- Minor changes to the overall pattern of the granite pavers from existing design.
- Replicated historic light standards would continue to be used in current and new locations.
- Preserve the existing spatial configuration of the half-block plaza between Cleveland Place and Broadway (Gateway Plaza), including the fountain.
- Retain the locations of shifts in transit-way alignment in keeping with the beginning, middle, and end design (LPA only).
- Possibility to retain a single row of aligned trees for 12 blocks (LPA only).
- Rebuild in place paver pattern design on the wide side of the asymmetrical blocks between Arapahoe and Market streets and Court Place and Cleveland Place (LPA Design Option only).

To mitigate potential impacts from construction-related vibration, CCD will contractually require third-party vibration monitoring during construction. The vibration monitoring requirement will include a baseline report, established vibration thresholds taking into account

special considerations for historic structures, and mitigation strategies should those thresholds be exceeded.

One archaeological site has been identified within the APE but is outside of the construction limits. No other archaeological sites have been identified within the APE or limits of construction. Although the same area was disturbed in the 1980s to build the Mall, and no archaeological sites were encountered during the original construction, there is still a chance archaeological resources could be discovered during construction. An Unanticipated Discovery Plan has been developed and is included in the Programmatic Agreement to specify treatment of previously unidentified archaeological resources identified during Project construction. In the event of a discovery, all surface- and subsurface-disturbing activities shall cease in the immediate area of the discovery, and the procedures outlined in the 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 the SHPO, in accordance with the plan.

More information about the Section 106 consultation process can be found in **Section 5.0**.

Table 3-5 shows the Project's anticipated impacts to cultural resources, and their potential mitigation. The LPA Design Option would not have adverse effects that would require mitigation beyond what is described for the LPA.

Table 3-5. Summary of Adverse Impacts and Mitigation Commitments for the LPA: Cultural Resources

Impacts	Mitigation
Direct Impacts • Adverse Effect to the 16th Street Mall historic property. Impacts would include realignment of the asymmetrical blocks, relocation of the transit ways, conversion of the median to a transit way on both the median and asymmetrical blocks, replacement and relocation of trees, introduction of additional tree species, and replacement of the existing granite pavers with new granite pavers. • Change in viewshed from cultural resources lining the Mall. • Potential discovery of unidentified archaeological resources.	**Direct Impacts** • Measures to mitigate the adverse effect are detailed in the draft Programmatic Agreement (**Appendix G**) and include design commitments to retain historic materials and design concepts as well as a process for developing mitigation in ongoing consultation as the design progresses. The Programmatic Agreement will need to be executed prior to completing a NEPA decision document, should FTA determine to approve the Project. • The Unanticipated Discovery Plan included with the Programmatic Agreement will be followed for archaeological resources.

Impacts	Mitigation
Indirect Impacts • No Impacts. **Temporary Construction Impacts** • Temporary effects to the setting and feeling of the cultural resources adjacent to the Mall during construction of the LPA. • Temporary changes to access to historic properties adjacent to the Mall during construction. • Construction-related vibration not anticipated to reach thresholds for impacts. • Potential discovery of unidentified archaeological resources.	**Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD will contractually require third-party vibration monitoring, which will include a baseline report, established vibration thresholds for historic structures, and mitigation strategies should those thresholds be exceeded. • The Unanticipated Discovery Plan included with the Programmatic Agreement will be followed for archaeological resources.

3.3 Visual and Aesthetic Resources

The visual environment encompasses elements from both the built and natural environments, including buildings, streetscapes, vistas, and the surrounding landscapes. This section examines potential impacts to the visual quality of the Mall and assesses whether the Project would induce additional light and glare in the study area (that is, in the views of and from the Project). In this urbanized environment, the study area extends to the building facades on either side of the Mall and includes vistas at cross streets and toward the Civic Center. The *Visual and Aesthetic Resources Assessment* in **Appendix B** provides a detailed analysis of visual and aesthetic resources.

3.3.1 Laws, Regulations, and Orders

Laws that direct consideration of preserving views and aesthetic resources in transportation-related planning projects include:

- NEPA, 42 U.S.C. 4321, Section 101(b)(2)
- 23 U.S.C. 138. Preservation of Parklands (a)
- 23 U.S.C. 319. Landscaping and scenic enhancement
- Denver Downtown Area Plan[3]
- Denver Revised Municipal Code, Chapter 10, Article IV. - Restrictions On Structures Within Areas Necessary To Preserve Mountain Views, Section 10-56
- Denver Revised Municipal Code, Chapter 10, Article V. Restrictions On Structures In The Civic Center Area, Sec. 10-81. - Purpose.
- City and County of Denver Executive Order 123, Chapter 8 – City Tree Preservation

[3] This plan is summarized further in **Appendix A**.

3.3.2 Methodology

The visual quality assessment follows the methodology and guidance documented in *Visual Impact Assessment for Highway Projects* (FHWA, 1988). This methodology provides a systematic and objective approach to evaluating the visual changes that would potentially result from implementation of a proposed project.

Photo-simulations of the proposed Project from typical or culturally significant views on the representative photographs of the Mall were used to provide a before and after view of the Project compared to baseline conditions. The degree of change to the visual character that would be caused by the Project is conducted by comparing photo simulations of the Project with photographs of existing conditions. Photographs taken at key observation points (KOP) represent typical views to demonstrate the before- and after-Project context. Visual simulations provide the basis for describing potential changes to visual character and visual quality.

3.3.3 Existing Conditions

3.3.3.1 Context of the Mall

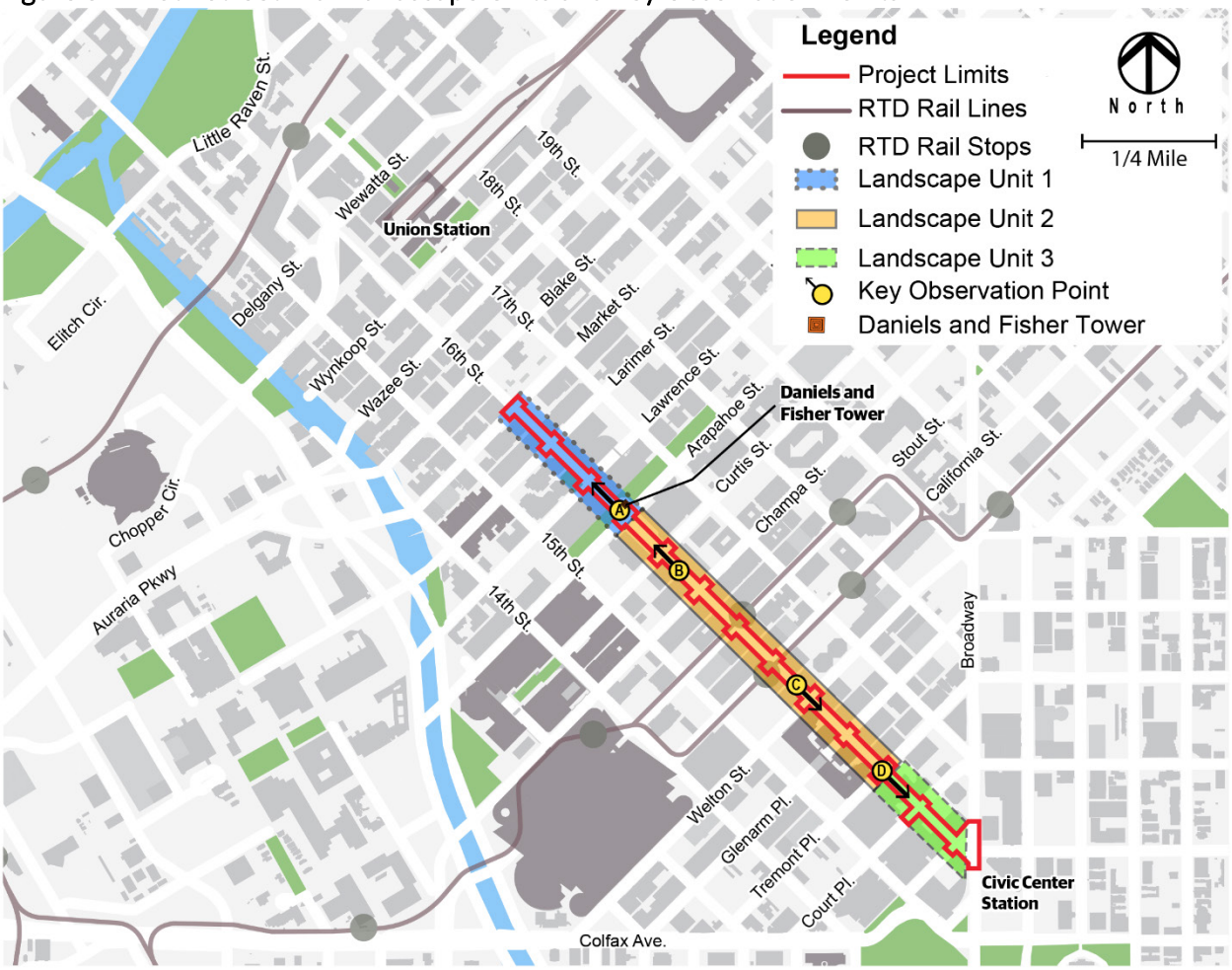
Since 1986, the Denver Downtown Area Plan has deemed the Mall to be the spine of downtown (CCD et al., 2007). To cultivate the identity, CCD, DDP, and the BID have sought to enhance the Mall as a priority pedestrian connection through implementing aesthetic treatments, limiting its use to transit and pedestrians only, and siting events within the corridor. The planning and implementation of the detailed landscape architecture plans structured the visual setting with paving, lighting, street furniture, and a division of pedestrian zones from the transit ways. At the center of this effort is the I.M. Pei–Hanna/Olin plan for what was referred to as the transit way/Mall (I.M. Pei & Partners, 1977), described in detail in **Section 1.0**.

The streetscape plan reinforces the visual experience of the Mall. The seven central symmetrical blocks of the Mall align with the older, early-20th-century buildings set directly on the edge of the pedestrian walkways 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, from Arapahoe Street to Tremont Place. The late-20th-century, taller buildings are located along the plazas and open spaces in the smaller asymmetrical rooms flanking the larger, central room, from Market Street to Arapahoe Street on the west end and Tremont Place to Broadway on the east end. The landscape units for this assessment were chosen to mirror the I.M. Pei–Hanna/Olin plan, as follows:

- Landscape Unit 1: West End (Market Street to Arapahoe Street)
- Landscape Unit 2: Middle Blocks (Arapahoe Street to Tremont Place)
- Landscape Unit 3: East End (Tremont Place to Broadway)

These landscape units have been evaluated by reviewing the visual quality at representative KOPs before and after the implementation of the Project. Both the landscape units and KOPs are illustrated on **Figure 3-7**; the figure shows the four representative KOPs selected for assessment of the effects of the LPA on the area.

Figure 3-7. 16th Street Mall Landscape Units and Key Observation Points



3.3.3.2 Sensitive Receptors

To some degree, assessment of visual resources is within the eye of the beholder, especially when it comes to valuing the local historic context that brings meaning to the landscape elements. Sensitive receptors for this Project are those people visiting or passing through the Mall who may be affected by changes to the visual quality. A degradation of the visual quality may upset them, change their appreciation of the area, or deter them from visiting the area in the future.

3.3.3.3 Visual Character and Visual Quality

There are three unifying design elements that define the visual character of the Mall, specifically the pavement pattern, the trees, and the lighting. The existing Mall design uses a shift in the transit corridor, along with a shift in tile pattern and streetscape, to create sub-areas within the Mall to suggest a beginning, middle, and end of the defined Mall. Other elements that vary within the Mall include a variety of architecture, kiosks, planter boxes, seating areas, and plazas or open areas adjacent to the Mall.

The lighting features were recently replaced with historic replica light fixtures to maintain the original unifying design elements. RTD surveyed and determined that the condition of the paving materials is in poor and unsafe condition (Atkinson, 2015). Pavement stones have been

worn, broken, chipped, and differently settling. The original design varies slightly among the median and asymmetrical blocks; asymmetrical blocks have a large diamond pattern between the trees, medium diamond pattern in the transit-way lanes, and small diamond pattern against buildings. The median blocks are the same except the trees are in the middle, separating the transit-way lanes.

An important aspect of the original design is the tree placement and species. There are 143 living trees within the Project limits. CCD conducted an arborist survey of the honey locust trees that line Landscape Unit 2 and the red oak trees that occupy Landscape Units 1 and 3 (Urban Trees + Soils, 2017). The results of the study show that, of the 199 trees planted per the I.M. Pei–Hanna/Olin plan, approximately one-third (61) are in either poor condition, dead, or missing, which has contributed to the degradation of visual and aesthetic quality of the Mall. The lighting stands have been replaced with historic replicas, but the degradation of the trees, along with dirt embedded in the granite and deteriorating mortar joints affecting the quality of the paving patterns, have had a substantial influence on the visual quality of the environment.

3.3.3.4 Landscape Unit 1: West End (Market Street to Arapahoe Street) with views of the Rocky Mountains, Skyline Park, and D&F Tower

The western end of the Mall is distinctively different than Landscape Unit 2 or 3: the uses, building types, and heights are more varied; the scale is not uniquely pedestrian oriented; and the Mall seems to be utilitarian rather than a refuge from the urban environment. The transit way is aligned towards the southern side of the Mall, with a wider pedestrian walkway on the northern side. Most of the trees in this landscape unit are dead or missing. Of the 44 trees originally planted, 8 are alive on the block between Market Street and Larimer Street, 6 are alive on the block between Larimer Street and Lawrence Street, and 1 is alive on the block between Lawrence Street and Arapahoe Street. Landscape Unit 1 has a medium-low visual quality.

3.3.3.5 Landscape Unit 2: Middle Blocks (Arapahoe Street to Tremont Place)

The middle landscape unit is the heart of the Mall, with an overall visual quality of medium. There are theaters and many evening activities in this portion of the Mall, as well as eateries and festive lighting that attract people to gather. Notable aspects of the Mall include trees in the center median amenity zone that provide a light umbrella of dappled light, and the visual interest of generally uniform height, material, and historic-era building facades, with some exceptions. The amenity zone in the median contains planters, seating areas, and kiosks. Some of the cafes and restaurants along the pedestrian walkway provide outdoor patios within the patio/gathering area, which is attractive and can be alluring.

3.3.3.6 Landscape Unit 3: East End (Tremont Place to Broadway)

The overall character of Landscape Unit 3 is distinguished by modern, high-rise professional buildings and open plazas, with only a few street-level uses. The juxtaposed street grid, open plazas, and tall buildings of the landscape unit allow views in multiple directions. This area is culturally important because it directs the viewer eastbound toward the Civic Center of Denver, featuring the State Capitol rotunda. This landscape unit is important for persons visiting and connecting with the city and state's Civic Center. The structure of Landscape Unit 3 provides a transition from the intimate pedestrian scale and leisure activities of the Mall's western blocks to Denver's urban, professional business, and Civic Center activities on the eastern end. The

high-rise buildings reflect light to the well-exposed plazas. This occasionally results in glare because there are currently not many trees to buffer it in this area of the Mall. The majority of the trees originally planted in this landscape unit died due to disease. New trees were planted in 2011 on the block between Tremont Place and Court Place, and these trees are in good health. On the 1.5 blocks between Court Place and Broadway, only 8 of the original 21 trees are living. The overall visual quality for Landscape Unit 3 is medium.

3.3.4 Impact Evaluation

Environmental consequences on the visual and aesthetic resources of the Mall are analyzed relative to the No Build Alternative, which represents what would happen to the Project area if nothing is done to the change the existing conditions other than cleaning and routine maintenance to fix safety hazards. The assessment considers the change in the landscape's **vividness, intactness, and unity** on a scale of low, medium-low, medium, medium-high, and high; the ratings for these three components are then averaged to provide a total visual quality rating using the same scale description.

3.3.4.1 No Build Alternative

The No Build Alternative would not result in construction impacts to the visual and aesthetic surroundings.

Because the No Build Alternative would not result in upgrading the Mall, the visual quality would remain the same; over time, the degradation of the Mall would result in lowered visual quality. Routine maintenance would become more difficult and the health of remaining trees may worsen.

Tree canopies help to block the glare where they have successfully grown: Under the No Build Alternative, Mall users would not be sheltered from the effects of glare from adjacent glass buildings in those areas where trees have died and not been replanted. The glare of buildings may affect how and where people go within the Mall to sit and relax. The current visual environment is a mix of medium-low to medium-high visual quality, but the fatigue of the environment is showing and has reduced the visual experience from its original intention.

Sensitive viewers would not notice immediate change, but degradation of the social environment could mean fewer viewers would visit the Mall than would occur if Project needs are met. It is typical for shoppers to desire a clean, well-kept, and safe environment to visit.

3.3.4.2 Locally Preferred Alternative

Short-term Direct and Indirect Construction Impacts

Visual disruptions during construction would include mechanized equipment, lights for evening work, material storage and delivery, and removal of excavated material seen to varying degrees by viewers near the construction area. In locations adjacent to residences, there would be a greater likelihood that residential viewers would find construction activities aesthetically and visually disruptive.

Most of the visual impacts during construction are of high intensity but low magnitude because they last for a relatively short period of time, except for the removal and replacement of trees. Tree removal and replacement would result in both high intensity of change and high magnitude of impact. The temporary loss of tree canopy would leave a more open

environment, less shade, and a reduced sense of enclosure while the new trees mature. The canopy is expected to recover by approximately two-thirds in 10 years. Mall viewers and users are likely to adjust to the visual change after an initial period of adjustment.

Phasing construction into concentrated segments and maintaining visual access to adjacent buildings and businesses can minimize some visual intrusion in duration and reduce the intensity of visual disruption.

Long-term Direct and Indirect Impacts

The visual quality assessment outlines common elements among the landscape units before assessing the effects of the LPA on the visual quality for each landscape unit.

Common Features Throughout the Project Limits

For all landscape units, the LPA includes lighting and tree placement within an amenity zone with fixed furnishings to delineate and physically separate the transit way from the pedestrian walkways and provide a visual separation from the transit ways without impeding access to them.

The LPA would be designed with a vertical curb in front of designated shuttle stops, at cross streets and intersections, and a pan along the remainder of the transit way. The vertical curb and pan granite units would be located between the transit way and the amenity zone. The visual effect of either option would result in a slight impact on the visual character of the Mall. While a vertical curb would provide a physical change in the elevation of the pavement, the tones and materials would blend with the pavement design and therefore become visually synonymous with the pavement as it currently functions. This would be even more true with the portion of each block with a pan, where the pavement design provides the primary delineation of the transit way, without a vertical elevation change. As noted previously, the pavement demarcation may not be as strong as a vertical curb, but the difference is slight. Textured delineation within the pedestrian walkways and between the amenity zone and transit way will add additional contrast and delineation under the LPA; however, the vertical curb and pan granite units would mimic the existing pattern and colors.

Trees, light poles, and fixed furnishings in the amenity zone will further visually delineate the transit way from the pedestrian walkway. The fixed furnishings and truncated domes at designated street and transit way crossings and potentially at shuttle stops would disrupt the pattern in some spaces.

Outreach with the ADA/Disability Advisory Committee during a subsequent design phase will determine material and color selections for the truncated domes and directional indicators and provide input on the design and location of fixed furnishings. This disruption would mostly only be noticeable from high viewpoints several stories above the Mall.

Material and design considerations for the LPA included durability and longevity, specifically in pavement and tree selection. This is particularly important for the vertical, strongest visual element – the trees. The LPA proposes to remove the existing 143 trees and plant 249 trees between Market Street and Broadway, for a total estimated canopy of 58,000 square feet in 10 years. There is currently approximately 95,000 estimated square feet of existing tree canopy between Market Street and Broadway. The LPA includes more trees than exist today, with the goal of expanding the tree canopy, in line with the CCD *2017 Outdoor Downtown Plan.* Tree

removal and planting would be consistent with Denver's Executive Order 123, Chapter 8, City Tree Preservation requirements.

The resulting vertical tree structure would not only preserve and enhance the visual identity of the Mall as a whole but also help differentiate the three separate zones of the Mall, because the New Asymmetrical end blocks would have three rows of trees and the Center Running blocks would have two rows of trees. One row of trees, an element of the original design, would be a consistent linear element through all three zones. The trees would also provide shade and a consistent ceiling height over the walkways, regardless of adjacent building heights.

The trees proposed (listed in Attachment A of the *Visual and Aesthetic Resources Assessment* in **Appendix B**) are both adaptable to the urban environment conditions, including heavy pruning, and are tall enough that they would not interfere with passing transit vehicles. The selected tree-types have a wide-spreading canopy and range in height from 30 to 50 feet high. Because of the improved tree infrastructure, varied species consistent with Denver forestry standards, and improved nursery practices for growing trees, the new trees are expected to be stronger and more vigorous than those previously planted.

The changes would be easy to chart for the viewers from the adjacent buildings. Viewers would be able to see the changes in channelization of the transit and pedestrian ways, paving patterns, and growth of the trees over time. These views would be substantial in magnitude, but since the majority of the visual environment is the indoor areas, the impacts would be of low intensity. Visual quality is experienced most vividly while within the landscape units. The following sections describe the changes by landscape unit for viewers within the Mall.

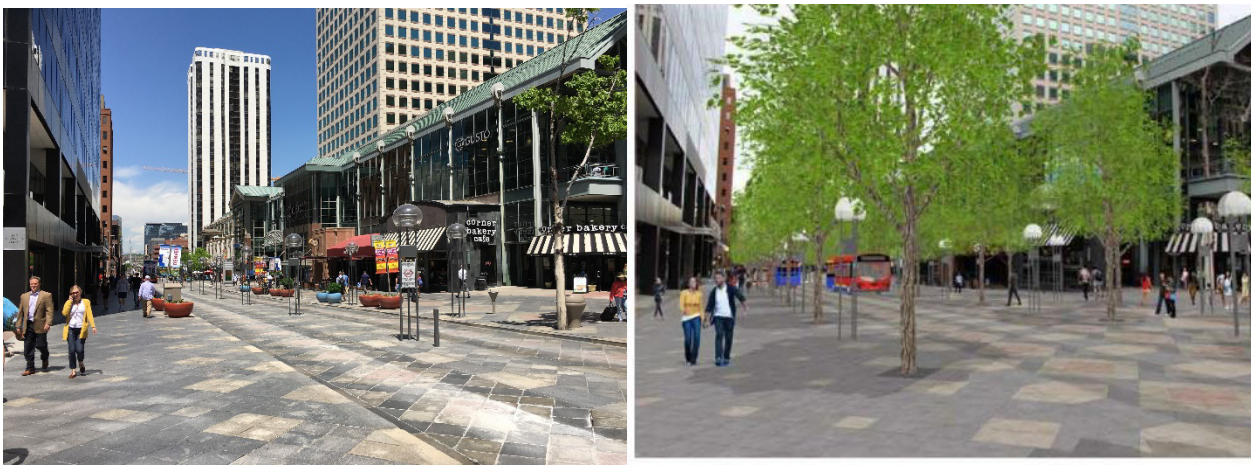
Landscape Unit 1: West End

Of all the units, the potential for visual change may be the most profound within Landscape Unit 1, which currently has only 14 living trees—half of which are in poor health—of the 44 trees originally planted in these blocks. Landscape Unit 1 is proposed with an asymmetrical design, similar to its current design. The LPA would remove the small median with lighting from within the middle of the transit way, add space to enlarge the narrow pedestrian walkway, and add a third row of aligned light posts and trees, in a new amenity zone, on the narrower side of the cross-section, which is to the south of the transit way.

The large privately-owned plaza spaces and publicly-owned Skyline Park would remain open for activities. The new Mall trees would create an enclosed environment for pedestrians within the wide range of building heights and bulk and provide a sense of outdoor rooms that would enhance the people-scale experience, which currently does not exist due to the number of dead and missing trees. In addition, the new pavement system, including subsurface modifications, would preserve the integrity of the paving pattern, with minor pattern adjustments; this, in conjunction with the tree canopy, would re-establish the design intent of the tree groves in these landscape units. The essence of the original design would remain intact, with strong unifying design elements contributing to this landscape unit. None of the features would remove views of D&F Tower. The additional row of trees on the south side of the transit way would add long-term tree canopy. Overall, the LPA would provide beneficial impacts to the visual quality, and the assessment would increase from medium-low to medium visual quality.

KOP A (**Figure 3-8**) demonstrates the key visual changes within Landscape Unit 1, with a view from Arapahoe Street looking west toward the Tabor Center Mall.

Figure 3-8. KOP A, View Looking West from Arapahoe Street – Existing Conditions and Visual Simulation



Landscape Unit 2: Middle

The cross-section of the LPA in Landscape Unit 2 is symmetrical in composition. In Landscape Unit 2, the transit way would replace the median amenity zone. Placing the transit way in the center relocates that space equally to the outside of the transit way. Specifically, the proposal would enlarge what is considered the front porch of the Mall's businesses from 17 feet under current conditions to 28 feet on both sides of the proposed transit way alignment, a portion of which would serve as an amenity zone buffer to the Free MallRide transit traffic from the pedestrian walkways (**Figure 3-8**). By placing the amenity zones closer to the buildings, they become visually owned by adjacent businesses because workers can more easily survey the area. This sense of ownership increases safety and often makes businesses more apt to remove left-over debris, thereby adding to the maintenance and clean environment.

The two rows of trees in the existing amenity zone would be placed closer to the building facades, between the pedestrian walkways and transit way, as opposed to farther away in the median in the current cross-section. This would provide another soft shield and shade over the amenity zone and pedestrian walkways (**Figure 3-9** for KOP B). In addition, spreading the trees out and placing the transit-way lanes together would provide waiting passengers more visible access to the oncoming or departing transit compared with the current separated transit-way lanes, which are divided by the trees. The design would not change the vividness of the historic core of the Mall. The composition of the LPA would honor the paving pattern theme and the lighting, so that the intactness of the I.M. Pei–Hanna/Olin plan is preserved. Unity would be enhanced to medium-high rating because the visual structure is straightforward and orderly. The LPA would slightly increase the visual quality of the middle landscape unit from medium to an overall medium-high visual quality.

Figure 3-9. KOP B, View from Curtis Street Looking West – Existing Conditions and Visual Simulation

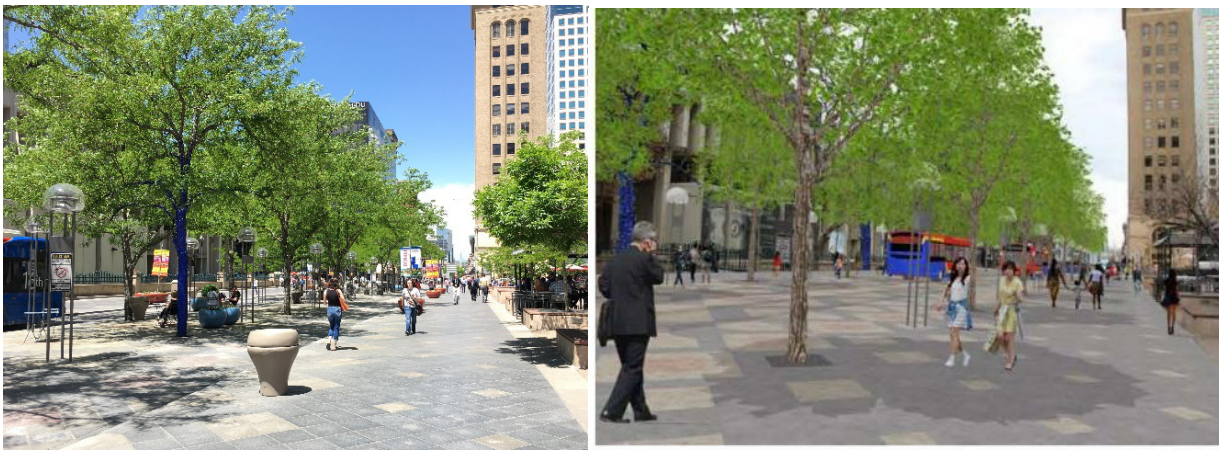


Figure 3-10 (KOP C) shows how center-running transit-way lanes would provide well-defined and generously wide amenity zones and pedestrian walkways along both outside edges of the transit way. This would reduce the number of pedestrians stepping into the transit way. The design simplifies how the streetscape distinguishes the transit way from the pedestrian walkways: removing pedestrians from between transit-way lanes, bulbing sidewalk corners at the intersections to shorten the distance of crossing the intersecting roadways, and widening the pedestrian walkways on both sides of the transit way and extending them away from the transit way with an amenity zone between them. This clear organization would provide ample space for visitors to linger and relax.

In summary, the LPA would enhance this landscape unit to an overall medium-high visual quality.

Figure 3-10. KOP C, View Looking East from Welton Crossing – Existing Conditions and Visual Simulation

Landscape Unit 3: East End

The asymmetrical design for Landscape Unit 3 would include a slight shift of the transit way, with three rows of trees interplanted with rows of light posts; two rows on the north side and one row on the south side of the transit way. The three rows of lights centered between trees would collectively define three distinct areas on the north side of the street – one for the patio gathering/area, one for the pedestrian walkway and amenity zone, and one for the transit way.

As viewed in the existing conditions and simulated view for KOP D on **Figure 3-11**, the additional trees could reduce the visibility of the Capitol from Tremont Place; however, on approaching Broadway, the north-side allée (or line) of trees along the pedestrian walkway would frame the view of the rotunda and maintain the vividness and memorable experience.

The new Mall trees on the north side of the transit way would create an enclosed environment for pedestrians, break up the mass of the tall glass buildings that surround Landscape Unit 3, and provide a sense of distinct outdoor areas (**Figure 3-11** shows a visual simulation of this option). The canopy is currently sparse because of the number of dead and missing trees. The tree canopy reduces the light glare that can refract from the glass buildings. The light fixtures would be positioned to frame the distinct outdoor areas of the Mall, enhance visibility and safety at night, and spread lighting on the trees from below, further defining the trees as columns supporting the ceiling-like tree canopy. By aligning trees and lighting, the transit way would be clearly defined. The additional row of trees on the south side of the transit way would add long-term tree canopy. The gateway plaza would be reconstructed to look as it does today with the existing transit way alignment, pattern, curbs, tree and fountain locations maintained. The LPA would support a high sense of unity within Landscape Unit 3, and would enhance the landscape unit from medium to a medium-high visual quality.

Figure 3-11. KOP D, Eastward View from Tremont Place, Adjacent to the Plaza – Existing Conditions and Visual Simulation

Cumulative Impacts

The visual character of the downtown area has largely been influenced by the backdrop of the Rocky Mountains and historic development that has resulted in a dynamic mix of historic and modern high-rise buildings. Within the downtown commercial district, numerous infill developments are either under construction or proposed, further emphasizing this trend.

As analyzed previously, implementation of the LPA would alter the existing visual environment by realigning the transit way, removing and planting new trees in new locations, moving light poles, and installing new pavement. Changes to the appearance of the Mall would mimic elements of the existing character to honor the original design, building upon its character-defining features. As discussed previously, the changes are expected to result in an overall beneficial impact on the visual quality and experience of the Mall.

The beautification of the Civic Center, recently completed Confluence Park, and DUS provide enhanced vistas that draw the users through the Mall. In addition, the former Market Street

Station redevelopment site and planned office, residential, and commercial buildings will continue to provide infill where currently there are gaps in the otherwise uniform enclosure around the Mall. Collectively, these planned improvements should further the vision for creating outdoor gathering areas that are defined by buildings and a ceiling of shade trees with visually interesting destinations. Therefore, the LPA would contribute to cumulative beneficial visual impacts to the Mall and nearby environment.

3.3.4.3 Locally Preferred Alternative Design Option

The LPA Design Option would be visually the same as the LPA with the following exceptions: a change in the number of blocks that would feature asymmetrical versus symmetrical design, and a proposed 2-foot shift of the transit way to the south on the asymmetrical blocks, resulting in a 2-foot reduction in patio/gathering space width and a misaligned row of trees on the south (narrow) side of the asymmetrical blocks.

The LPA Design Option would elongate the symmetrical design by two blocks, which results in only one-and-a-half to two asymmetrical blocks at either end. This is a substantial departure from the I.M. Pei–Hanna/Olin plan with respects to the defined landscape units. The I.M. Pei–Hanna/Olin plan specifically differentiated the symmetrical design of the blocks with historic buildings (Landscape Unit 2) separately from the asymmetrical design of the blocks with newer buildings, which vary in setbacks from the Mall and architectural influences (Landscape Units 1 and 3). The LPA Design Option would diminish the size of the asymmetrical end “rooms” to the extent that the change in visual experience may not be coherent as a separate and distinct unit, thereby undermining the purpose of the change in design between the symmetrical and asymmetrical rooms. Lack of clarity and unity in the design reduces the visual enhancement as compared with the LPA. Additionally, by reducing the number of blocks with asymmetrical design, there would be fewer trees planted, since these blocks are intended to contain three rows of trees versus only two rows of trees in the symmetrical blocks.

The reduction of the patio/gathering space on the south side of the asymmetrical blocks from 9 feet to 7 feet would pull both the pedestrian walkway and the amenity zone with a row of trees closer to the buildings by 2 feet. The offset of the amenity zone and the tree plantings as compared with the symmetrical blocks by 2 feet may reduce vista opportunities from within the Mall. Because vistas play an important role in the cultural use of the Mall, misaligned tree plantings may reduce the visual aesthetic experience compared to the LPA. Similarly, the transitions between the symmetrical and asymmetrical design for the transit way would result in transit-way lanes being offset by 6 feet, versus only 4 feet for the LPA. The staggered alignment in the transit way across these two intersections would not be as subtle as the LPA, which may appear disjointed and unintentional.

The reduced shade potential and the reduced patio/gathering space in the asymmetrical blocks as well as the misaligned tree rows across the landscape units are opposed to the stated viewer preferences recorded for the Mall and its environs.

The visual quality of the Project with the LPA Design Option would be improved over the No Build Alternative, but less visually coherent and with lower intactness than the LPA.

3.3.5 Mitigation

Temporary visual impacts during construction will be reduced by constructing the LPA in segments along the Mall, to limit the duration of major construction activities directly in front of each property.

Nighttime construction will follow local regulatory requirements. Nighttime lighting during construction will be directed downward to reduce the impacts of light on adjacent residences.

No further mitigation is proposed for the visual impacts associated with tree removal beyond that required under CCD Executive Order 123, Chapter 8, City Tree Preservation, and the minimization measures planned in the Project design including planting over 50 more trees than was originally designed in the I.M. Pei–Hanna/Olin plan; planting larger more mature trees that have been grown in a manner to reduce their dormancy after planting, allowing them to reach full canopy more quickly than standard tree planting practices; and constructing a tree infrastructure system that adheres to current best practices for tree health.

Table 3-6 shows the Project's anticipated impacts to visual and aesthetic resources, and their potential mitigation. The LPA Design Option would not have adverse effects that would require mitigation beyond what is described for the LPA.

Table 3-6. Summary of Adverse Impacts and Mitigation Commitments for the LPA: Visual and Aesthetic Resources

Impacts	Mitigation
Direct Impacts • Change in appearance of the Mall when viewed from buildings lining the Mall. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Visual disturbances during construction. • Temporary tree and tree canopy removal and reduction.	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • Construction will be phased to limit the duration of major construction activities directly in front of single properties. • Nighttime lighting will be directed downward to reduce the impact of the light on adjacent residences and hotel rooms. • The temporary loss of trees and tree canopy will be mitigated consistent with CCD Executive Order 123, Chapter 8, City Tree Preservation.

3.4 Public Safety and Security

This section examines potential impacts and benefits to real and perceived crime; safety and security services; emergency service providers (routes); and pedestrian, bicycle, and transit incidents on the Mall. It also contains an assessment of whether the Project would commit to measures to mitigate these impacts.

3.4.1 Laws, Regulations, and Orders

RTD's *Bus Infrastructure Design Guidelines and Criteria* (RTD, 2016a) and *Bus Infrastructure Standard Drawings* (RTD, 2016b) include strategies for implementing bus user safety and crime protection measures through design, to minimize potential threats including visibility, lighting, and elimination of structural hiding places. In addition, RTD follows applicable FTA safety and security measures and guidelines during design, construction, and operation of transit service facilities. RTD- and FTA-funded projects follow a comprehensive Safety and Security Certification process for minimizing potential for harm to the public. CCD law enforcement is also consulted on ways to minimize threats to the public.

In additional to public agency actions, local businesses have taken steps, such as the *Downtown Security Action Plan* (DDP, 2016), to work within the local regulatory context to make Mall safe and secure.

3.4.2 Methodology

A desktop review of data related to crime, location of emergency service providers, Free MallRide shuttle hard stop claims (claims resulting from when the shuttle suddenly stops), crashes, and incidents within the Project study area was conducted. The CCD Open Data Catalogue (CCD, 2017e) provided crime data. RTD provided incident report summary data related to Free MallRide shuttle hard stop claims, crashes, and incidents reported on the Mall. The data were analyzed for trends, and the No Build Alternative, LPA, and LPA Design Option were then evaluated for their ability to address safety risks and security threats.

3.4.3 Existing Conditions

The assessment of safety and security has been broken into four subcategories: Crime; Safety and Security Service Providers; Emergency Service Routes; and Pedestrian, Bicycle, and Transit Vehicle Incidents and Hard Stops. The following subsections summarize the existing conditions for each category.

3.4.3.1 Crime

Crime data on the Mall from 2012 to October 9, 2017 were downloaded from the CCD's Open Data Catalogue (CCD, 2017e). The reported offenses were submitted in National Incident-based Reporting System (NIBRS) standard format (DOJ, 2014). NIBRS is a crime incident reporting system that not only records the number and type of crime committed but also collects attribute data such as date and time, all offenses that occurred during an incident, demographic information, relationship information, date of arrest, and other details.

Total crime in the study area peaked in 2014 and has been decreasing since. Between Broadway and Market Street, as seen for the study area as a whole, crime has decreased since 2014. Between Market Street and Chestnut Street, crime has annually increased since 2012. **Table 3-7** summarizes the amount of total crime within the study area.

Table 3-7. Summary of Reported Offenses in the Study Area

Year Reported	Study Area Total	Broadway to Market within Study Area	Market to Chestnut (1 block west of Wewatta) within Study Area
2012	738	643	95
2013	1,679	1,547	132
2014	2,613	2,425	188
2015	2,442	2,225	217
2016	2,116	1,841	275
2017 (through October 9)	1,575	1,338	237
Total (2012 to October 9, 2017)	11,163	10,019	1,144

Source: CCD, 2017e

Of the crimes committed on the Mall, the most common classification is "All Other Crimes." Examples of All Other Crimes include, but are not limited to, trespassing, disobeying a lawful order, giving false information to police, police interference, resisting arrest, fighting, weapon possession-related, and violation of court order. Other crimes that occur on the Mall at greater percentages are larceny (23.3 percent), drug/alcohol-related (14.0 percent), traffic accident-related (10.3 percent), and public disorder (9.3 percent). **Table 3-8** summarizes the types of crime within the study area.

Table 3-8. Summary of Types of Crime in the Study Area

Type of Crime	Count	Percent of Total Crime
Aggravated Assault	285	2.6
Murder	4	0.0
Drug/Alcohol	1,565	14.0
Auto Theft	146	1.3
Robbery	295	2.6
Larceny	2,605	23.3
Burglary	193	1.7
Theft from Motor Vehicle	128	1.1
Arson	3	0.0
Public Disorder	1,037	9.3
White Collar Crime	100	0.9
Traffic Accident	1,147	10.3

Type of Crime	Count	Percent of Total Crime
Other Crimes Against Persons	657	5.9
All Other Crimes	2,998	26.9
Total (2012 to October 9, 2017)	11,163	100.0

Source: CCD, 2017e

3.4.3.2 Safety and Security Service Providers

Safety and security service providers were identified through internal discussions with stakeholders and a desktop survey that identified the service providers and their locations near the Project study area (**Figure 1-1 [Page 1-2]**). **Table 3-9** lists and summarizes these safety and security service providers operating in or with jurisdiction to operate within the study area.

Table 3-9. Safety and Security Service Providers for the Study Area

Service Type	Service Provider	Applicable Information
Security	RTD Security and Police	RTD employs transit police officers, security officers, and other supervisors, monitors, and fare checkers to deter crime and provide emergency response to their facilities, including vehicles, transit ways, stations, and park n rides.
Security	Private Security Team	The BID contracts with Allied Universal Security Services to augment the work of the Denver Police Department. The private security team does not replace the role of the Denver Police Department.
Security	Denver Police Department	Local police force for the CCD. The study area falls within District 6.
Fire/ Miscellaneous Emergency Response	Denver Fire Department	Local fire department for the CCD, including the study area. There are no fire stations within the study area; however, there are three within its proximity (Fire Stations #1, #4, and #6).
Paramedics	Denver Health Paramedic Division	The sole provider of emergency medical services for the CCD.

There are no hospitals or medical centers in the study area. The closest hospitals or medical centers to the study area are the following:

- Concentra Urgent Care – adjacent to 17th Street study area boundary at Blake Street
- St. Joseph Hospital – approximately 1 mile from study area
- Presbyterian St. Luke's Medical Center – approximately 1 mile from study area
- Denver Health Medical Center – approximately 1 mile from study area

3.4.3.3 Emergency Service Routes

The locations of emergency service providers were identified through a desktop survey and spatially compared to the study area and Project limits. Potential routes between emergency

service providers and the Project limits were considered against proposed Project features to determine if those features would reduce response times.

There are 17 streets that cross the study area that could be used as emergency service routes and 12 cross streets within the Project limits, not including Broadway and Market Street. Vehicular cross streets are controlled by traffic lights at their intersections with the Mall. The roadway system in downtown Denver includes several alternating one-way roadways; however, the grid still allows for multiple emergency response route options to most locations. 15th (west-only one-way street) and 17th (east-only one-way street) streets run parallel to the Mall and provide vehicular access to the 17 streets that intersect with the Mall. Emergency responders can currently access the 16th Street transit way at its intersections with local roadways and use the transit way, as needed. Emergency service, security, and safety providers can currently park in the median of the median blocks during an emergency or to stage services, without blocking transit operations. Transit operations are disrupted when emergency, security, or safety providers access the existing asymmetrical blocks. Transit operations can be configured block-by-block to facilitate space for emergency response service, as needed.

3.4.3.4 Pedestrian, Bicycle, and Transit Vehicle Crashes, Incidents, and Hard Stops

An assessment of reported pedestrian, bicycle, and transit vehicle crashes and incidents, including the methodology, is documented in the *16th Street Mall – Pedestrian, Bicycle, and Transit Vehicle Crash and Incident Report Analysis* technical memorandum (Incident Report Analysis) in **Appendix B**. Transit incident reports for the RTD Free MallRide were provided by RTD. As a first step, all reported RTD Free MallRide incidents from 2007 to 2017 were reviewed. In general, total reported incidents were high in 2008, 2009, and 2017, at approximately 100 total incidents in those years (the 2017 results did not include December). There has been no consistent trend of overall of claims increasing or decreasing. Of the incidents that occurred between 2007 and 2017 (784 reports in total), 46 incidents or 5.6 percent are reported to include an injury.

The annual RTD Free MallRide data were further evaluated to determine what types of incidents were taking place on the Mall. From 2007 to 2017, four shuttle incident types were counted: (1) pedestrian, (2) fixed object, (3) another vehicle, and (4) other. The frequency of those incident types descends from other (319), another vehicle (221), and fixed object (172), to pedestrian (72). Pedestrian incidents have been less frequent from 2014 to 2017 than in previous years.

Using the report data provided by RTD, pedestrian-related incidents were located on the Mall based on the nearest intersection in the Project limits. The result was a mapping of pedestrian-related incidents to the nearest intersection. Overall, 63 pedestrian-transit injury or non-injury reports were created, with 21 injuries, from 2007 to 2017, or an average of about 2 per year. Of the total amount of pedestrian incidents that claimed an injury, 16 occurred within the median blocks (Curtis Street to Glenarm Place), 3 occurred in the transitions between median blocks and asymmetrical blocks (Arapahoe Street and Tremont Place), and 2 occurred in asymmetrical blocks (Market Street to Lawrence Street and Court Place to Broadway) (median and asymmetrical blocks are defined in **Section 2.0**).

The total count of pedestrian incidents follows a similar pattern: 47 occurred on median blocks, 4 occurred on the transitions between median blocks and asymmetrical blocks, and 9 occurred on asymmetrical blocks. The data indicate approximately five times as many pedestrian-transit incidents occur on median blocks as on asymmetrical blocks. The following five segments (each segment is a grouping of crash data points divided into geographic segments), about 5 blocks, account for 71 percent of pedestrian-transit incidents: Champa Street intersection, Stout Street and Stout/Champa Street, California Street and California/Welton Street, Welton Street, and Glenarm Place. These five segments are all median blocks.

In addition to the Incident Report Analysis, RTD hard-stop claims data were assessed (RTD, 2017c) for the time period 2007-2017. 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. Of all the hard stops that occurred in the Project limits, 124 occurred on median blocks, 18 occurred on the transitions between median blocks and asymmetrical blocks, and 59 occurred on asymmetrical blocks. The data indicate that just over twice as many hard stops occurred on median blocks than on asymmetrical blocks. It should be noted that there are 7 median blocks and 5 asymmetrical blocks within the Project limits.

Similarly, RTD pedestrian claims data (RTD, 2017d) from 1997 to 2017 were assessed. Of all the pedestrian claims that occurred in the Project limits, 359 occurred on median blocks, 50 occurred on the transitions between median blocks and asymmetrical blocks, and 134 occurred on asymmetrical blocks. Again, this result indicates over twice the number of incidents reported on median blocks compared to asymmetrical blocks.

Pedestrian count data from 2015 and 2016 (Gehl, 2016) were evaluated to assess whether larger pedestrian counts in the median blocks could be driving the apparent increase in pedestrian-transit incidents, hard stops, and pedestrian claims on median blocks. The pedestrian count data indicate that on average there are approximately 57 percent more pedestrians within the median blocks, as compared to the asymmetrical blocks. There are 420 percent more pedestrian-transit incidents, 110 percent more hard stops, and 170 percent more pedestrian claims in the median blocks, as compared to the asymmetrical blocks. Thus, there appears to be a higher frequency of pedestrian-transit incidents, hard stops, and pedestrian claims per pedestrian in the median blocks, as compared to the asymmetrical blocks.

As noted in **Section 1.0**, a condition of the Mall is that the granite pavers are slippery when wet or when ice is present because dirt has filled in the finish of the pavers, reducing friction on them. This condition decreases safety on the Mall for pedestrians, contributing to potential slips and falls, and makes it more difficult to operate transit vehicles, which have difficulty gaining traction to start and stop.

3.4.3.5 Crime Prevention Through Environmental Design (CPTED)

The purpose of CPTED is to use 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 following five CPTED principles are applicable to the design and use of the Mall:

1. Natural surveillance. Clear sight lines, such that all spaces in a public area are visible to others, reduce the incidence of crime; a person is less likely to commit a crime if they think someone will see them do it. Clear sight lines exist throughout the Mall. However, the

transit ways and shuttle operations surrounding the medians are a real and perceived barrier and restrict natural surveillance on the medians.

2. Territoriality. Placement of pedestrian walkways and gathering spaces adjacent to buildings allows for active "ownership" of public spaces; potential trespassers perceive this ownership and are discouraged from illicit activities. The isolation of the median spaces in between transit ways, and away from buildings and primary walkways, results in low ownership and surveillance of the median spaces.
3. Access control. This principle uses walkways, lighting, and landscape to clearly direct the flow of people and to decrease the opportunity for crime. The linear features of the Mall's design, along with the placement of furnishings, patios, and other amenities, direct the flow of people on the Mall. Some disruptions to this flow occur where people gathering for shuttle stops obstruct the pedestrian flow on narrow pedestrian walkways. The medians were originally designed as a pedestrian promenade, but because of its small size and isolation from primary activity areas, pedestrians do not use it this way. The DDP has tried to implement several programs to increase pedestrian use of the median, such as an educational campaign encouraging median use and hiring people to walk in the medians; these programs were not successful. The medians are now primarily used for staying activities, and many blocks include kiosks and furnishings in response to these activities; however, the medians remain underused and often attract negative and illegal behavior.
4. Management and maintenance. Well-managed and maintained properties make places safer. Current maintenance and security programs on the Mall (for example, the *Downtown Security Action Plan*) have been successful in reducing crime on the Mall over the past 3 years.
5. Activity support. Programmed activities draw pedestrian users and discourage illicit activities by people who desire anonymity for their actions. The DDP provides active programming that brings people to the Mall, such as concerts and markets.

3.4.4 Impact Evaluation

3.4.4.1 No Build Alternative

Safety and security on the Mall would remain unchanged with the No Build Alternative. The frequency of crime would continue at current levels, and pedestrian-transit crashes and incidents and pedestrian claims would continue at current or greater levels based on the projected increase in ridership and pedestrian traffic. The granite pavers would not be replaced and therefore the same slippery surface would remain, causing slips and falls for pedestrians and lack of traction for the Free MallRide during inclement weather. DDP would continue to implement the *Downtown Security Action Plan.*

3.4.4.2 Locally Preferred Alternative

Short-term Direct and Indirect Construction Impacts

Crime and Security. The LPA construction site would represent an unattractive nuisance and serve as an opportunity for theft of materials and equipment. These same conditions occur at all construction sites. However, most of these issues can be mitigated through good planning,

fencing, and law enforcement. Both RTD and CCD have extensive experience in providing secure and safe construction sites.

Safety. Safety-related impacts during construction include pedestrian hazards, such as trips, slips, and falls. Open excavations and the presence of construction equipment are also potential threats. These risks are modified by the same measures as listed in the previous paragraph. In addition, construction activities will slightly modify emergency response routes when traffic lanes or intersections within the Project limits are temporarily closed. As previously noted, the downtown street system allows for multiple detour options to a single location.

Long-term Direct and Indirect Impacts

Crime and Security. As previously noted, FTA-funded projects follow the Safety and Security Certification process (**Section 3.4.5**) for minimizing threats to the public. This process is initiated during the Preliminary Design phase and continues through construction. However, at this planning level, the evaluation of several broad conclusions can be made as herein.

Concentrations of people can increase the potential for crime and security threats. The proposed LPA is anticipated to reduce these risks and represent a positive long-term impact because of the continued provision of deterrents such as closed-circuit televisions (CCTVs), and better incorporation of CPTED principles. The configuration of the LPA effectively eliminates the median amenity zone of the Mall. Removing this feature is expected to reduce the potential for negative and illegal behavior, such as assaults, burglary, fighting, and public disorderly conduct. Transit operations within the Project limits would be disrupted when emergency, security or safety providers access the Mall, in the same way operations are disrupted under existing conditions on asymmetrical blocks. Transit operations can be configured block-by-block to facilitate space for emergency response service, as needed.

Additionally, the 9-foot-wide patio/gathering area would enhance public use of the Mall and contribute to natural surveillance and territoriality on the Mall, decreasing negative social behaviors and improving security on the Mall, at Free MallRide shuttle stops, and on the Free MallRide.

The amenity zone would contain fixed furnishings that would encourage public use and provide physical barriers to keep vehicles in the transit way from entering the pedestrian walkway, increasing security without hindering pedestrian permeability across the Mall. In summary, the LPA is projected to result in long-term positive impact to public security.

Safety. Safety threats will be addressed in the Safety and Security Certification process, which will start during subsequent design phases. However, several planning-level predictions regarding improvements in safety, to reduce crashes and claims, can be made with respect to implementing the LPA.

The configuration of the LPA design is predicted to improve public safety in the following ways:

- *Eliminates medians*. The LPA design (**Figure 2-4 [Page 2-9]**) eliminates the median blocks where most of the accidents have occurred in past years. This was one of the key basic functions of the LPA design. Based on the existing conditions previously described, the LPA is predicted to mitigate the frequency of pedestrian-transit incidents, hard stops, and pedestrian claims.

- *Safer pedestrian crossings.* The current median block cross-section design for pedestrians crossing the Mall results in two separate crossing maneuvers. The LPA simplifies the pedestrian crossing maneuver, consolidating crossing conflicts into a well-defined single transit way, and the time needed to cross the transit way is reduced as the length of the overall crossing maneuver is reduced. To reduce the time taken to cross the cross streets, bulb-outs would be implemented at cross streets where feasible, and where they don't block other existing or planned transportation modes such as light rail transit and bicycle lanes. Outside of shuttle stops, pedestrians would no longer step onto or from a curb when crossing the transit way, removing a tripping hazard, and wheelchair users could cross the transit way more freely. A 2-foot-wide linear strip of granite vertical curb and pan would define the edge of the transit way as it does under existing conditions.

  For transit drivers, this design is anticipated to improve their ability to see pedestrians as the transit-way alignment is consolidated and the provisions of the added amenity zone between the transit way and pedestrian walkway improves their ability to see pedestrians. Truncated domes would be installed at designated transit way and roadway crossings and would adhere to City and County of Denver and ADA standards. They would be constructed of a different material than the granite pavers, and their color would comply with ADA standards regarding visual detectability and contrast, as applicable. This has the potential to reduce accidents between motor vehicles and pedestrians on the cross streets. Approximately 10 percent of the security incidents on the Mall relate to traffic incidents.

- *Better delineation between transit and pedestrians*. The design provides an amenity zone to physically separate the pedestrian walkway and transit way, textured delineation between the transit way and amenity zone to assist visually impaired users in detecting the edge of the transit way, and directional indicators—potentially of a different material and color than the granite pavers—along the edges of the pedestrian walkway to guide visually impaired users within the walkway and connect them with designated transit way or roadway crossings. These features would keep pedestrians aware that they are next to an active transit way and physically separate them from the transit way, while maintaining the ability to cross the Mall at any location. Truncated domes, of a different material than the granite pavers, would be installed at designated street or transit way crossings and potentially at designated shuttle stops to direct people to stand an appropriate distance from the transit way and arriving shuttles. When there is a curb, these strips are recommended by the Transit Cooperative Research Program (2008) to increase pedestrian and transit passenger safety by reducing the potential for collisions between pedestrians and shuttles at shuttle stops. The proposed amenity zone is consistent with current guidance from FHWA and NACTO (FHWA, 2013 and 2017; NACTO, 2013 and 2016). Vertical elements such as the placement of trees, light poles, and fixed furnishings would further visually and physically delineate the transit way from the pedestrian walkway.

  Currently, the shuttles use the existing vertical curb as a starting block to gain traction and to maintain operation within the confines of the guideway during slippery conditions such as rain or snow. The increased-friction pavement surface under the LPA would provide better traction during wet or icy weather and improve the existing slippery condition, and the current shuttle fleet is equipped with dual rear tires compared to single tires on the previous fleet. The vertical curb at shuttle stops would provide a physical barrier to keep

slow-moving shuttles within the transit way in event of slippage and provides some delineation with the vertical feature at the edge of the transit way.

- *Passenger interface with shuttles.* Vertical curbs will be provided at designated shuttle stops to maintain or improve the step height on and off the shuttles. The vertical curb at designated shuttle stops will also maintain or improve the slope of the shuttle ramp, when deployed for passengers.
- *Wider pedestrian walkways*. Widening pedestrian walkways to 10 feet where they are currently 8 feet will allow more people to walk on the walkway and not feel the need to walk in the transit way.
- *Reduced-slip surfaces.* In addition to cross-section design features, the LPA would implement granite pavers with an increased-friction pavement surface, which would reduce slips and falls and provide better traction to the Free MallRide shuttles.
- *Other design features to improve safety*. As noted in **Section 2.0**, the LPA would incorporate CPTED principals into the design of the Mall. CPTED criteria will increase natural surveillance, territoriality, and access control, and provides an appealing gathering space to support public activities. The LPA design would serve as a benefit to existing efforts, such as the *Downtown Security Action Plan,* to reduce crime on the Mall.

Cumulative Impacts

The LPA is being designed to address safety hazards and improve conditions for pedestrians and vehicles (**Section 2.0**). It will also be subject to the thorough Safety and Security Certification process required by FTA for all transit projects. The safer, less crime-prone environment provided by the LPA, in combination with the continued implementation of the *Downtown Security Action Plan* and security features on the Mall such as security officers, police patrols, and security cameras, would contribute to a safer downtown Denver and is considered a beneficial cumulative impact.

3.4.4.3 Locally Preferred Alternative Design Option

The LPA Design Option would result in the same impacts to public safety and security as the LPA, except for on the asymmetrical blocks, where the LPA Design Option would reduce the patio/gathering area width to 7 feet. This would reduce the primary generator of public activity on the Mall by one-third, which would result in a small reduction of natural surveillance activity on these blocks.

3.4.5 Mitigation

As stated in **Section 3.4.1**, design and construction of the LPA will comply with applicable CCD and RTD design criteria. CCD, RTD, and DDP will meet with an ADA/Disability Advisory Committee during subsequent design phases to receive input on delineating features and other components of the Mall design related to accessibility. CCD and RTD will establish design criteria during the preliminary design phase. CCD and RTD, in coordination with the contractor, will evaluate design elements like directional indicators and tactile warning strips during the final design phase prior to accepting the design for construction. Additionally, CCD will implement a third-party review to verify that the design and construction of the improvements

complies with ADA requirements, coordinating with RTD to account for RTD's Free MallRide fleet configuration and capabilities.

Under the project delivery process, the contractor will become engaged in the Safety and Security Certification process during the design process. Safety and Security Certification is a process that begins with preliminary engineering and will continue through final design and construction and ends when the Project construction is complete. The first steps of the process are the development of a Preliminary Hazard Analysis, Threat and Vulnerability Analysis and a Certifiable Items List (CIL) regarding design elements that influence Safety and Security (S&S). These processes identify all the S&S risks expected to be associated with the LPA and the appropriate mitigation. These mitigation measures become a part of the design criteria and the fulfillment of these criteria is monitored though the design and construction phases. The documents for managing this process are anticipated to include the following:

- Design basis manual, which includes CPTED and other safety and security criteria
- S&S certification plan
- Updated CIL
- Design criteria conformance checklists
- Construction specification conformance checklists
- Construction safety and security plan (to address risks during the construction phase)
- Operations and maintenance training CIL or checklist
- Operations and maintenance training manuals CIL or checklist

CCD and RTD will coordinate on strategies for minimizing impacts to transit operations when emergency, security, or safety service providers are present within or adjacent to the transit way during subsequent design phases.

Emergency service providers will be given adequate detour information, including advanced notice before construction, to ensure access is maintained during construction. The TMP will include protocols for developing detours and communicating with emergency providers.

Table 3-10 shows the Project's anticipated impacts to public safety and security, and their potential mitigation. The LPA Design Option would not have adverse effects that would require mitigation beyond what is described for the LPA

Table 3-10. Summary of Adverse Impacts and Mitigation Commitments for the LPA: Public Safety and Security

Impacts	Mitigation
Direct Impacts • Changes to the Mall design related to ADA compliance. • Potential for public safety threats.	**Direct Impacts** • Compliance with applicable CCD and RTD design criteria. • CCD, RTD, and DDP will meet with an ADA/Disability Advisory Committee during subsequent design phases to receive input on delineating features and other components of the Mall design related to accessibility. CCD and RTD will establish design criteria during the preliminary design phase. CCD and RTD, in coordination with the contractor, will evaluate design elements like directional indicators and tactile warning strips during the final design phase prior to accepting the design for construction. • CCD will implement a third-party review to verify that the design and construction of the improvements complies with ADA requirements, coordinating with RTD to account for RTD's Free MallRide fleet configuration and capabilities. CCD and RTD will coordinate on strategies for minimizing impacts to transit operations when emergency, security, or safety service providers are present within or adjacent to the transit way during subsequent design phases. • CCD, in coordination with RTD, will implement the FTA Safety and Security Certification process, which identifies and minimizes threats to the public during operation of the LPA. The documents for managing this process are anticipated to include the following: – Design basis manual, which includes Crime Prevention Through Environmental Design and other safety and security criteria – Safety and Security Certification Plan – Updated Certified Items List (CIL) – Design criteria conformance checklists – Operations and maintenance training CIL or checklist

Impacts	Mitigation
Indirect Impacts • No impacts. **Temporary Construction Impacts** • Temporary impacts during construction to police, fire and emergency response times because of temporary lane or intersection closures within the Project limits.	**Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD, in coordination with RTD, will implement the FTA Safety and Security Certification process, which identifies and minimizes threats to the public during construction. The documents for managing this process are anticipated to include the following: – Safety and Security Certification Plan – Updated CIL – Construction specification conformance checklists – Construction safety and security plan (to address risks during the construction phase) • Emergency service providers will be given adequate detour information, including advanced notice before construction, to ensure access is maintained during construction. • The TMP will include protocols for developing detours and communicating with emergency providers.

Note:

BMP = best management practice

3.5 Resources with No or Minimal Impacts

Summary-level evaluations are provided for resources for which the LPA and LPA Design Option would cause no or minimal long-term impacts. Applicable technical reports for the resources in the following sections are located in **Appendix B** and provide additional detail on impacts of the LPA. The LPA Design Option is not discussed in the technical reports; it would have the same impacts to these resources as the LPA.

Because the LPA and LPA Design Option would either have no impact or negligible long-term impacts to the resources described in this section, the LPA and LPA Design Option would not contribute to long-term cumulative effects to these resources.

Cumulative impacts associated with construction activities arise when simultaneous construction projects compound the effects of street closures, detour routes, additional traffic, and other construction-related nuisances, such as noise. Substantial development is planned within the commercial core of Denver during the development of the Mall. The LPA and LPA Design Option would contribute to cumulative temporary construction-related effects from noise; construction phasing and BMPs would minimize the duration and intensity of effects in any one particular area. Measures to mitigate impacts from construction-related noise and air quality impacts are noted in the following sections and in **Table 3-11**, presented at the end of this section.

The No Build Alternative would result in no or minimal long-term or construction impacts to the resources in this section. Existing conditions would be maintained, including current maintenance activities.

3.5.1 Land Use

This section evaluates impacts to land use. **Appendix B** contains detailed tables and figures. Commercial land uses currently dominate 16th Street from Wynkoop Street to Broadway, particularly at the ground floor and subterranean level, although other uses (including residential, public/institutional, and open space) are also present. There are also a few surface parking lots. Development along 16th Street is guided by planning documents and the Downtown Neighborhood Context zoning. Areas on and surrounding the Mall, including the Downtown Theater District, the Open Space Public Parks District, and Lower Downtown, are a part of the city's most prominent public environment and the business, entertainment, and urban lifestyle center of the region. Zoning generally allows for all primary land use classifications as follows: Residential; Civic, Public and Institutional; Commercial Sales, Services, and Repair; Industrial, Manufacturing, and Wholesale; and Agriculture. Future land use in the vicinity of the Project limits would be consistent with and similar to current land use.

Under the LPA and LPA Design Option, no temporary impacts to current or future land uses are anticipated because both would improve Mall facilities without changing Mall uses. Once construction is completed, the LPA and LPA Design Option would complement and enhance the current zoning and land use plans envisioned for the downtown Denver area, resulting in no long-term impacts to land use. Transit improvements, enhanced landscaping, lighting, and other elements will be put into place that will result in a more attractive and safer business, visitor, and pedestrian experience.

3.5.2 Stormwater

The existing surface drainage system within the Project limits discharges into inlets located at curbs along the transit way and on cross streets. The inlets connect to CCD's storm sewer, which directly discharges, without treatment, to Cherry Creek, a tributary to the South Platte River. Both Cherry Creek and the South Platte River are listed as 303(d) impaired waters. Cherry Creek is listed as a 303(d) impaired water for *E. coli* and the South Platte River is listed for arsenic (CDPHE, 2016).

The existing Mall does not provide drainage for runoff that seeps below the surface mortar and granite, so moisture that penetrates below the surface is trapped for extended amounts of time. The sub-base mortar setting is saturated for much of the year and subjected to freeze and thaw cycles, eroding the sub-base materials and contributing to the deterioration of the pavement system.

The LPA and the LPA Design Option would not add additional impervious surfaces and would not change operational elements for transit and vehicular use on the Mall and cross streets; therefore, they would not result in an increase in concentration of pollutants. Under the LPA and LPA Design Option, 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 and 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. Neither the LPA nor the LPA Design Option would introduce a new linear element into the historic pavement pattern, and inlets would be designed to be context-sensitive or resemble the existing inlets. Under the LPA and LPA Design

Option, the collection, conveyance, depth, and spread of stormwater flow would be different than under existing conditions.

The LPA and LPA Design Option would implement a surface and sub-base drainage system that would discharge runoff to the storm sewer system. On cross streets where the bulb-outs would be constructed, the collection, conveyance, depth, and spread of stormwater flow would be different. The design of the drainage system will comply with the CCD *Storm Drainage Design & Technical Criteria Manual* (CCD, 2017a) .

Runoff associated with the LPA or LPA Design Option would receive water quality treatment, to the extent possible. Treatment BMPs will be determined during subsequent design phases.

A stormwater management plan will be developed and implemented that specifies temporary BMPs to avoid and minimize soil erosion, sedimentation, and overflow from construction site runoff (e.g., silt socks, silt fences, and detention facilities, if applicable). In addition, a spill control plan will be developed to lay out protocols to avoid and minimize the unwanted release of substances during construction as part of a Materials Management Plan.

3.5.3 Noise and Vibration

Noise and vibration evaluations for the Project were completed using the FTA *Transit Noise and Vibration Impact Assessment* manual (FTA, 2006). FTA updated their noise and vibration assessment guidance in 2018 (FTA, 2018), and the conclusions of this noise and vibration analysis are valid under the newer guidance. State and local noise regulations (specifically, Colorado Statute 25-12-103 and CCD Code of Ordinances, Chapter 36 – Noise Control) were consulted, but they do not reference nor are they applicable to noise sensitive land uses, and they were therefore not used for this evaluation.

The survey of existing land uses revealed that a total of 33 noise-sensitive land uses are within the 150-foot noise screening distance, and 3 vibration-sensitive land uses are within the 50-foot vibration screening distance. Additional details may be found in the *Noise and Vibration* technical memorandum provided in **Appendix B**.

Under the new asymmetrical cross-section design (**Figure 2-4 [Page 2-9]**), the transit way would shift 7 feet farther away from the edge of the Mall on the southern side under the LPA and 5 feet farther away under the LPA Design Option, and 1 foot closer to the edge of the Mall on the northern side under the LPA and 1 foot farther away under the LPA Design Option. Under the center-running cross-section design (**Figure 2-4 [Page 2-9]**), the transit way would shift 9 feet further away from the building face on both the northern and southern sides of the Mall. The downtown environment has multiple sources of existing ambient noise, including traffic, pedestrians, and businesses along the Mall. Because the transit way will be shifting away from the building face in most cases, that shift will not result in increased noise levels. In places where the transit way shifts 3 feet closer to sensitive resources, it is unlikely that the limited distance will 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. The electric shuttles are so quiet that they use noisemakers for safety, to alert pedestrians that shuttles are coming. The noisemakers would remain under the LPA and LPA Design Option.

According to the FTA *Transit Noise and Vibration Impact Assessment* manual (FTA, 2006*)*, vibration impacts are unlikely for transportation projects that involve rubber-tired vehicles, except in unusual situations. 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 likely.

Temporary increases in noise levels are anticipated during construction due to construction-activities and equipment use needed to deconstruct the existing Mall and implement the Project. Construction noise will be minimized through implementation of a Nose Control Plan and in compliance with the CCD *Standard Specifications for Construction General Contract Conditions* (2011) and noise ordinance (Denver Code of Ordinances, Section 36). The CCD noise ordinance includes the following measures:

- Limit construction noise on weekdays between 9 p.m. and 7 a.m. to ordinance thresholds.
- Limit construction noise on weekends between 9 p.m. and 8 a.m. to ordinance thresholds.
- Construction equipment must be properly maintained, used for the manufacturer's intended purpose, and operated in compliance with any required license.

FTA's *Transit Noise and Vibration Impact Assessment* identifies thresholds for potential annoyance from construction equipment vibration. Based on the type of equipment and the interference of vibration sensitive buildings, the FTA criteria for a substantial vibration impact during construction would not be exceeded. The FTA guidance also provides a damage threshold for building types. Based on the type of equipment anticipated to be used during construction, the FTA criteria for engineered concrete and masonry buildings would not be exceeded. These criteria are included in the FTA guidance to be used during the environmental phase of a project to identify any potential problem locations that must be addressed during final design. CCD will ensure the contractor implements the PIP, which will include measures referenced in **Section 3.1**.

3.5.4 Air Quality

The Project is located in Denver County, Colorado. The Project is in an area which is designated as attainment[4] for nitrogen dioxide (NO_2), particulate matter less than or equal to 2.5 micrometers in diameter ($PM_{2.5}$), sulfur dioxide, and lead for National Ambient Air Quality Standards (NAAQS). The area is in nonattainment for ozone and is in maintenance for carbon monoxide (CO) and particulate matter with a diameter of less than or equal to 10 micrometers (PM_{10}).

The following analyses were conducted to determine if the LPA or LPA Design Option would impact air quality.

- Localized carbon monoxide and particulate matter impacts: Neither the LPA nor LPA Design Option would generate new vehicle trips to the Project area or cause traffic congestion at

[1] Attainment with the NAAQS means the area is consistently meeting the NAAQS.

local intersections; therefore, localized CO and PM_{10}/$PM_{2.5}$ impacts would not occur in the Project area.

- Mobile source toxics: Because the Project would not affect traffic patterns or vehicle volume in the Project area, the Project is not expected to increase mobile source air toxic emission in the Project area or cause adverse impacts.
- Construction impacts: During construction, short-term air quality impacts would occur because of the release of dust and particulate emissions generated by excavation, grading, hauling, and other construction-related activities. Exhaust emissions from construction equipment and vehicles are also expected and would include CO, nitrogen oxide (NOx), volatile organic compounds, and directly emitted PM_{10} and $PM_{2.5}$. The total emissions and the timing of the emissions from these sources would vary depending on the construction phasing for and design of the Project.

In addition, the Project is exempt from transportation conformity requirements because it is a combination of safety improvement, transportation enhancement, pavement resurfacing and rehabilitation, and pedestrian facility. These activities are exempt from the transportation conformity requirements per 40 CFR 93.126.

To minimize and mitigate construction-related dust impacts, the Project will comply with federal and state air quality standards for fugitive dust control, as required in the CCD *Standard Specifications for Construction, General Contract Conditions* (2011). CCD will contractually require a Fugitive Dust Control Plan. Examples of fugitive dust control measures that may be implemented are watering exposed soils and stockpile areas, and covering trucks hauling soil or fine materials.

CCD will contractually require a Construction Air Quality Control Plan. CCD will also monitor Air Quality through the Denver Department of Public Health and Environment monitoring throughout construction. To minimize and mitigate construction-related emissions, the contractor will work with CCD and RTD to develop measures to minimize exhaust emissions and exposure to exhaust emissions. Examples of measures to limit exhaust emissions that may be implemented are limiting unnecessary idling, using alternatives for diesel fuel and diesel engines where possible, locating stationary engines away from residential areas, and using construction equipment that is both the practical engine size for the intended job and properly tuned and maintained.

3.5.5 Utilities and Infrastructure

The utilities under 16th Street were renewed during the construction of the Mall completed in 1982. Records from construction of the Mall were reviewed between Market Street and Larimer Street and between Tremont Place and Court Street. In general, utilities under the Mall consist of storm sewer and inlets, water mains, sanitary sewer, conduit and wiring (including electrical and telecommunication), and natural gas pipes. There may be basement vaults within the Project limits, extending from basements located adjacent to the Mall. Subsurface tree infrastructure consists of tree boxes and irrigation lines. Tree boxes on the Mall have a soil volume of 300 cubic feet (Urban Trees + Soil, 2017).

Under the LPA or LPA Design Option, access to electricity would be improved. Reconstructing the Mall also provides the opportunity to accommodate current and future technologies (for

example, wi-fi, infrared, or fiber-optic). The LPA and LPA Design Option would also improve tree growing conditions by installing a modern suspended tree infrastructure that provides 1,000 cubic feet of soil volume, such as a silva cell or equivalent system.

No long-term adverse impacts to utilities or subsurface infrastructure are anticipated under the LPA or LPA Design Option because existing infrastructure would be protected in place and reused, replaced in the same location with appropriate protections, or replaced and relocated within the Project limits. The need for protecting or relocating utilities and infrastructure would be coordinated with utility owners and CCD.

During construction, there is the potential for limited interruption of service to customers. Disruption of service provided by the existing utilities' infrastructure will be limited to the extent possible. Temporary interruptions in utility service will be coordinated with affected property owners and tenants. CCD will ensure the contractor implements the PIP, which will include measures to inform stakeholders about temporary disruption of utility service. These measures are referenced in **Section 3.1**.

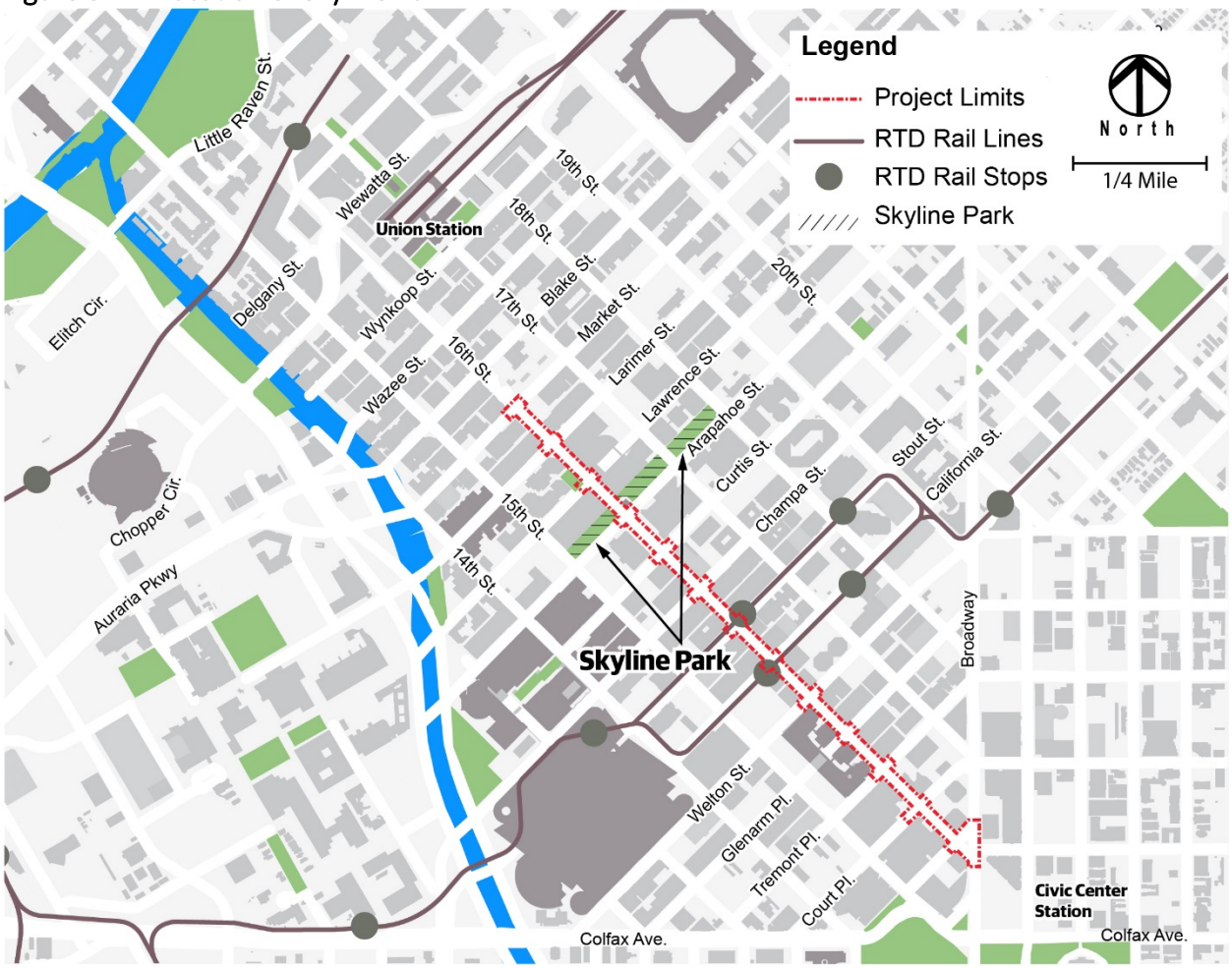
3.5.6 Parklands and Recreational Resources

One recreational resource and designated city park is located within the study area, Skyline Park (**Figure 3-12**). Skyline Park is not within the Project limits. Skyline Park encompasses 3.2 acres and runs along Arapahoe Street from 15th Street to 18th Street. This park is owned by CCD and managed by the Denver Parks and Recreation Department, with supplemental maintenance provided by the BID. A partnership between CCD and DDP stages events at the park, such as a skating rink in the winter and a pop-up beer garden in the summer to benefit the community. The park is landscaped and has restrooms, a visitor's center, and picnic tables that are accessible year-round.

Long-term impacts to Skyline Park from the LPA or LPA Design Option would be minimal because no property would be acquired and no changes in access are proposed. If events in the park (i.e., movie nights, a skating rink in the winter, and a pop-up beer garden in the summer) were to temporarily close off the Mall to transit service to allow overflow of pedestrians into the transit way, the pan separating the transit way from the amenity zone would be less of a tripping hazard than a vertical curb and would provide greater flexibility for public use of space on the Mall.

Access to the park during construction could be limited from the Mall, but access would be maintained from other streets for the duration of construction. CCD, in coordination with RTD, DDP, and the contractor, will prepare and implement a PMP that will include a plan for maintaining access to Skyline Park during construction.

Figure 3-12. Location of Skyline Park



3.5.7 Social Conditions and Community Facilities

Between the year 2000 and 2015, the DUS and CBD neighborhoods experienced rapid population and household growth. DUS more than doubled in population (2,225 in 2000 to 5,062 in 2015) and households (1,588 in 2000 to 3,439 in 2015), while CBD also doubled in population (2,005 in 2000 to 4,049 in 2015) but fell short of doubling in households (1,421 in 2000 to 2,495 in 2015). The DUS and CBD neighborhoods also saw large increases in median household incomes between 2000 and 2015 of 143 percent and 90 percent, respectively. Denver experienced employment changes, with a net increase of 25,692 jobs between 2000 and 2016. Forecasts indicate additional household and job growth in the Union Station and CBD neighborhoods. **Appendix B** contains detailed data and a methodology discussion.

Community facilities within immediate proximity to the Mall are Black Cube Art (museum), the Christian Science Reading Room, and the Money Museum and Federal Reserve, and Bright Horizons Montessori on the Mall.

Temporary construction impacts are not anticipated to affect the demographic composition of the neighborhoods under the LPA or LPA Design Option. Construction activities could affect public events, such as the Denver Day of Rock or the New Year's Eve fireworks.

Implementing the LPA or LPA Design Option could indirectly result in demographic changes over the long term. If upgrades to the Mall increase its value as a destination, including for public events, the neighborhood along the Mall might become more desirable for owning or renting real estate. The increased demand may increase real estate prices, which would attract more affluent households. The increase in the neighborhood population and number of visitors could also increase employment opportunities (for example, in the service industry [such as restaurants] and professional services [such as financial planning and legal services].

In its post-construction condition, the LPA and LPA Design Option could result in an increase in visitors to community facilities as the Mall becomes a more attractive place for pedestrians to spend time. During construction, community facilities, in particular those immediately adjacent to the Mall, could experience a decline in visitors because of temporary changes in access to transit, and pedestrian facilities, traffic congestion, and impacts to noise, air quality, and visual resources.

CCD, in coordination with RTD, DDP, and the contractor, will prepare and implement a PMP and TMP that will include a plan for minimizing and mitigating impacts to the local residents and community facilities. CCD will ensure the contractor implements the PIP, which will include measures referenced in **Section 3.1**.

3.5.8 Hazardous Materials

A modified environmental site assessment was performed for the Project that included an analysis of hazardous materials, including hazardous waste. In support of the analysis, and per ASTM International (ASTM) Standard 1527, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process,* an environmental records review and a site reconnaissance were conducted. The information is documented in the *Modified Phase 1 Environmental Site Assessment, 16th Street Mall, Denver, CO* technical memorandum included in **Appendix B**.

The site reconnaissance revealed no visual signs or evidence of any potential hazards at the surface. The analysis of hazardous material sites revealed 21 previously documented sites within 1/16th of a mile (330 feet) of the Mall centerline. The documented hazard sites include leaking underground storage tanks (LUST), Recovered Government Archives LUST (RGA LUST), and a State Hazardous Waste Site (SHWS), as well as current and former dry-cleaning sites; the status of those sites is as follows:

- The LUST sites are classified as closed. However, the State of Colorado allows for risk-based closures, so closed sites may still have soil containing low levels of residual contamination.
- Remediation of the SHWS site is classified as completed in 1995.
- None of the operating or former dry-cleaning sites have been identified as currently having or having had releases of hazardous materials. However, release of dry-cleaning solvent may have occurred; if so, solvent vapors may be present in the ground near these locations.

Although no known hazardous materials have been identified, ground-disturbing construction activities could expose undocumented soil or subsurface contamination that could harm human health (for example, for workers during construction). In addition, CCD has advised that there is a potential to encounter abandoned buried utilities below the Mall walkways and road; it is

currently unknown what utilities may be present or if they are encased. While performing excavation activities, caution should be used to not damage or break open any casing material. A trained and certified asbestos inspector should be present to clear any utility material before it is moved or disturbed. All utilities should be treated as live until confirmed otherwise.

The LPA and LPA Design Option would not impact hazardous material sites or the handling of hazardous materials, as the risk from hazardous materials would occur during construction and would be the same under both options.

A Health and Safety Plan will be prepared for the Project that prescribes activities for workers to follow in areas with the potential for undocumented soil contamination based on visual observation or smell. The Health and Safety Plan will include the following:

- Provisions for briefing construction staff before work regarding what to look for
- A list of contact persons in case of an encounter with undocumented contamination
- Provisions for the following:
  - Immediate notification of construction management if an encounter with undocumented contamination occurs
  - Notification of the applicable enforcement agency of the find
  - Consultation with the applicable enforcement agency
  - Process for determining further actions

A Materials Management Plan will also be developed to ensure removal and disposal of hazardous materials follows all federal, state, and local requirements.

The Project will comply with Occupational Safety and Health Administration requirements for construction workers who may be exposed to hazardous materials. If undocumented contamination is discovered, construction activities would cease until it is determined, in coordination with CCD Department of Public Works and other appropriate regulatory agencies that work can proceed without risk of injury to persons or the environment.

3.5.9 Environmental Justice

This section discusses potential impacts to low income populations. Because of the lack of minorities present near the study area, as documented through the 2010 United States Census and 2011-2015 American Community Survey, minority populations are not adversely and disproportionately affected and are therefore not discussed in this section. **Appendix B** contains the analysis to support these conclusions.

According to the 2011-2015 American Community Survey, CCD had a median household income of $53,637 in 2015. The median household income in the DUS neighborhood (census tract 17.01) was almost $82,000 per year, while the CBD neighborhood (census tract 17.02) had a median household income of $58,242 per year. In the study area, approximately 19 percent of the households have incomes below the poverty line. In the city and county of Denver, approximately 16 percent of the households have incomes below the poverty line.

With the exception of economic and cultural resources impacts, short-term and long-term impacts would either be negligible or encompass the entire length of the Mall evenly. Construction impacts would be temporary and localized, moving along the Mall with the

construction segments. To the extent low-income households own businesses or work along the Mall, they could be affected by a reduction in revenue during construction. Because impacts are evenly distributed across the Project limits, neither the LPA nor the LPA Design Option adversely and disproportionately affect a low-income population. The Mall is a cultural resource for the entire city and county of Denver. Therefore, impacts to the 16th Street Mall historic property would not adversely and disproportionately affect low-income populations.

Potential reduction in revenue experienced during construction by any businesses owned by low-income households would be addressed by the mitigation measures described in **Section 3.1**. To minimize and mitigate impacts, CCD, in coordination with RTD, DDP and the contractor, with input from businesses adjacent to the Project limits, will prepare and implement a PMP that will include a plan for minimizing and mitigating impacts to local businesses. CCD will ensure the contractor implements the PIP, which will include measures referenced in **Section 3.1**.

Table 3-11. Summary of Adverse Impacts and Mitigation Commitments for the LPA: Resources with No or Minimal Impacts

Land Use Impacts	Land Use Mitigation
Direct Impacts • No adverse impacts. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • No impacts.	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • No mitigation required.
Stormwater Impacts	**Stormwater Mitigation**
Direct Impacts • Changes to collection, conveyance, depth and spread of stormwater on the Mall. • Changes to collection, conveyance, depth and spread of stormwater on cross streets where bulb-outs would be constructed. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Changes to the collection, conveyance, depth, and spread of stormwater for the area under construction and its vicinity. • Potential construction-related sedimentation and water quality impacts, without mitigation.	**Direct Impacts** • Stormwater collection and conveyance systems will be designed and constructed to handle stormwater in compliance with CCD's *Public Works Standards, Details, Manuals, Plans & Studies* (CCD, 2017a). • Stormwater collection and conveyance systems will be designed and constructed to handle stormwater in compliance with applicable CCD design criteria. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD, in coordination with the contractor, will develop and implement a stormwater management plan that specifies temporary best management practices to avoid and minimize soil erosion, sedimentation, and overflow from construction site runoff (for example, silt socks, silt fences, and detention facilities, if applicable). • CCD, in coordination with the contractor, will develop and implement a spill control plan to layout protocols to avoid and minimize the unwanted release of substances during construction as part of a Materials Management Plan.

Noise and Vibration Impacts	Noise and Vibration Impacts
Direct Impacts • Minimal to no impacts. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Construction-related noise. • Nighttime construction-related noise. • Construction-related vibration not anticipated to reach thresholds for impacts.	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • Compliance with CCD *Standard Specifications for Construction, General Contract Conditions* (CCD, 2011) • CCD, in coordination with the contractor, will develop a Noise Control Plan that outlines allowable daytime and nighttime construction, Project noise levels, and location and types of noise abatement measures required to meet specific noise limits for the associate construction work. • Compliance with the CCD noise ordinance (Denver Code of Ordinances, Section 36), including the following measures: – Construction noise limited on weekdays between 9 p.m. and 7 a.m. to ordinance thresholds. – Construction noise limited on weekends between 9 p.m. and 8 a.m. to ordinance thresholds. • CCD will contractually require third-party vibration monitoring. The vibration monitoring requirement will include a baseline report, established vibration thresholds taking into account historic structures, and mitigation strategies should those thresholds be exceeded. • Construction equipment must be properly maintained, used for the manufacturer's intended purpose, and operated in compliance with any required license. • CCD will ensure the contractor implements the PIP, which will include the following outreach strategies to inform stakeholders about construction-related issues such as noise: – Issue construction updates and post them on the Project website. – Provide advance notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings. – A public information line of communication will be established and available to field public comments and complaints during construction. – Prepare materials with construction information about construction. – Address property access issues. – Assign staff to serve as liaisons between the public and contractors during construction.

Air Quality Impacts	Air Quality Mitigation
Direct Impacts • No impacts. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Release of dust and particulate emissions generated by excavation, grading, hauling, and other construction-related activities. • Exhaust emissions from construction equipment and vehicles are also expected and would include carbon monoxide, nitrogen oxide, volatile organic compounds, and directly emitted particulate matter less than or equal to 10 and 2.5 micrometers in diameter (PM_{10} and $PM_{2.5}$).	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD will ensure the contractor is in compliance with federal and state air quality standards for fugitive dust control, as required in the *Standard Specifications for Construction, General Contract Conditions* (CCD, 2011). Examples of fugitive dust control measures that may be implemented are watering exposed soils and stockpile areas, and covering trucks hauling soil or fine materials. • CCD will contractually require a Construction Air Quality Control Plan and Fugitive Dust Control Plan. CCD will also monitor Air Quality through the Denver Department of Public Health and Environment monitoring throughout construction. • CCD, in coordination with the contractor, will develop measures to minimize exhaust emissions and exposure to exhaust emissions. The following are examples of measures to limit exhaust emissions that may be implemented: limit unnecessary idling, use alternatives for diesel fuel and diesel engines where possible, locate stationary engines away from residential areas, and use construction equipment that is both the practical engine size for the intended job and properly tuned and maintained. • As part of the PIP, a public information line of communication will be established and available to field public comments and complaints during construction.

Utilities and Infrastructure Impacts	Utilities and Infrastructure Mitigation
Direct Impacts • Protection in place, replacement in place, or relocation of utilities within the Project limits. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Potential limited interruption of service.	**Direct Impacts** • Utilities will be relocated in coordination with the utility owner and CCD. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • Disruption of service provided by the existing utilities infrastructure will be limited to the extent possible. • Temporary interruptions in utility service will be coordinated with utility owners, affected property owners and tenants. • CCD will ensure the contractor implements the PIP, which will include the following outreach strategies to inform stakeholders about construction-related issues such as the disruption of utility service: – Issue construction updates and post them on the Project website. – Provide advance notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings. – A public information line of communication will be established and available to field public comments and complaints during construction. – Prepare materials with information about construction. – Address property access issues. – Assign staff to serve as liaisons between the public and contractors during construction. • Detailed existing utility information will be collected prior to the start of construction.
Parklands and Recreational Resources Impacts	**Parklands and Recreational Resources Mitigation**
Direct Impacts • No impacts. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Potential temporary restrictions to access to Skyline Park from the Mall, but access would be maintained from other streets. No other recreational resources are located within or immediately adjacent to the Project limits.	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD, in coordination with RTD, DDP and the contractor, will prepare and implement a PMP that will include a plan for maintaining access to Skyline Park during construction.

Social Conditions and Community Facilities Impacts	Social Conditions and Community Facilities Mitigation
Direct Impacts • No adverse impacts. **Indirect Impacts** • Could increase demand for real estate adjacent to the Project limits. **Temporary Construction Impacts** • Community facilities could experience a decline in visitors during construction because of temporary changes to transit and pedestrian facilities; traffic congestion; and impacts to noise, air quality, and visual resources.	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD, in coordination with RTD, DDP and the contractor, will prepare and implement a PMP and TMP that will include a plan for minimizing and mitigating impacts to the local residents and community facilities. • CCD will ensure the contractor implements the PIP, which will include the following outreach strategies to inform stakeholders about construction-related issues: – Issue construction updates and post them on the Project website. – Provide advance notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings. – A public information line of communication will be established and available to field public comments and complaints during construction. – Prepare materials with information about construction. – Address property access issues. – Assign staff to serve as liaisons between the public and contractors during construction. • Additional mitigation is discussed in this table under Visual and Aesthetic Resources, Noise and Vibration, Air Quality, Transit Operations, Traffic Operations, and Pedestrian Facilities.

Hazardous Materials Impacts	Hazardous Materials Mitigation
Direct Impacts • No impacts. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Potential to encounter undocumented soil or subsurface contamination that could harm human health. • Potential to encounter abandoned or undocumented utilities.	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD will ensure the contractor develops and implements a Health and Safety Plan, to protect workers. • CCD will ensure the contractor will comply with Occupational Safety and Health Administration requirements for construction workers who may be exposed to hazardous materials. • A trained and certified asbestos inspector will be present to clear any utility material before it's moved or disturbed. • CCD will ensure the contractor develops and implements a Materials Management Plan, to ensure removal and disposal of hazardous materials follows all federal, state, and local requirements. • All utilities will be treated as live until confirmed otherwise. • If undocumented contamination is discovered, construction activities will cease until it is determined, in coordination with CCD Department of Public Works and other appropriate regulatory agencies, that work can proceed without risk of injury to persons or the environment.

Environmental Justice Impacts	Environmental Justice Mitigation
Direct Impacts • No impacts. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Temporary impacts to the approximate 370 businesses adjacent to the Project limits, some of which are minority-owned. Effects may include disruption of pedestrian flow, noise and restricted or changed access. • Potential temporary decline in sales for businesses adjacent to the Project limits, including minority-owned businesses.	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD, in coordination with RTD, DDP and the contractor, with input from businesses adjacent to the Project limits, will prepare and implement a PMP that will include a plan for minimizing and mitigating impacts to local businesses. • CCD will ensure the contractor implements the PIP, which will include the following outreach strategies to inform stakeholders, including environmental justice populations about construction-related issues: – Issue construction updates and post them on the Project website. – Provide advance notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings. – A public information line of communication will be established and available to field public comments and complaints during construction. – Prepare materials with information about construction. – Address property access issues. – Assign staff to serve as liaisons between the public and contractors during construction

SECTION 4

Transportation Systems

This section describes the analysis of transportation systems and impacts associated with the No Build Alternative, LPA, and LPA Design Option. Analysis was completed for four transportation resources: transit operations, traffic operations, and pedestrian and bicycle facilities. Each analysis includes review of applicable regulatory context; an account of the affected environment; a description of the methodology used to evaluate each resource; disclosure of potential impacts; and measures to avoid, minimize, or mitigate impacts. The disclosure of potential impacts covers long-term (operations) direct, short-term (construction) direct, indirect, and cumulative impacts.

Because impacts to traffic operations and bicycle facilities would be the same under either the LPA or LPA Design Option, they are documented together in the same subsection for each resource. For transit operations and pedestrian facilities, where impacts would differ, the LPA Design Option is documented in a separate subsection. The following is a list and definition of impacts evaluated in this section:

- **Long-term impacts** will occur after construction is complete.
- **Short-term impacts** will be associated with construction activities and will be temporary.
- **Direct impacts** are caused by the proposed action and "occur at the same time and place as the proposed action" (40 CFR 1508.8).
- **Indirect impacts** are caused by the proposed action and "are later in time or further removed in distance, but are still reasonably foreseeable" (40 CFR 1508.8).
- **Cumulative impacts** result from "the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually-minor but collectively-significant actions taking place over a period of time" (40 CFR 1508.7). The *Cumulative Effects* technical memorandum in **Appendix B** provides additional context for the cumulative impacts evaluation, including the methodology, study areas, and past, present, and reasonably foreseeable future actions.

Cumulative Impacts. The LPA and the LPA Design Option would have beneficial long-term impacts to transit operations and pedestrian facilities through improved mobility. Cumulatively, this would contribute to improved mobility throughout downtown and the region when combined with past, present, and reasonably foreseeable future actions. Neither the LPA nor the LPA Design Option would have long-term impacts to traffic operations or bicycle facilities; therefore, neither would contribute to long-term cumulative impacts to traffic operations or bicycle facilities.

Cumulative impacts associated with construction activities arise when simultaneous construction projects compound the effects of street closures, detour routes, and additional traffic. Substantial development is planned within the commercial core of Denver during the development of the Mall. The LPA and LPA Design Option would contribute to cumulative construction-related effects on transit and traffic operations and pedestrian and bicycle

facilities from lane closures and transit and pedestrian detours associated with numerous construction projects occurring at the same time; proper construction phasing, the PMP, and TMP would minimize the duration and intensity of effects.

4.1 Transit Operations

4.1.1 Laws, Regulations, and Orders

The FTA Office of Planning and Environment provides the following guidance for assessing transportation impacts (FTA, 2016):

> *The environmental documentation for projects should discuss potential impacts of project construction and operation on transit systems. Specific transit considerations for the construction and operation of transit projects include, but are not limited to changes in:*
>
> 1. *Transit service (e.g. frequency, hours of service, network, etc.)*
> 2. *Travel times*
> 3. *Transit ridership and demand*
> 4. *Shuttle stop locations and access*
> 5. *Station access and circulation*

4.1.2 Methodology

The impacts of the LPA and the LPA Design Option on transit operations are anticipated to be limited to the construction phase, because it has been agreed that the RTD service plan for the Free MallRide will remain unchanged after the updating and reconstruction of the Mall. Short-term impacts of construction would involve possible activities that could affect shuttle travel times and access to the Free MallRide, and therefore erode ridership. The extent of the impacts would depend on the construction phasing, means, and methods.

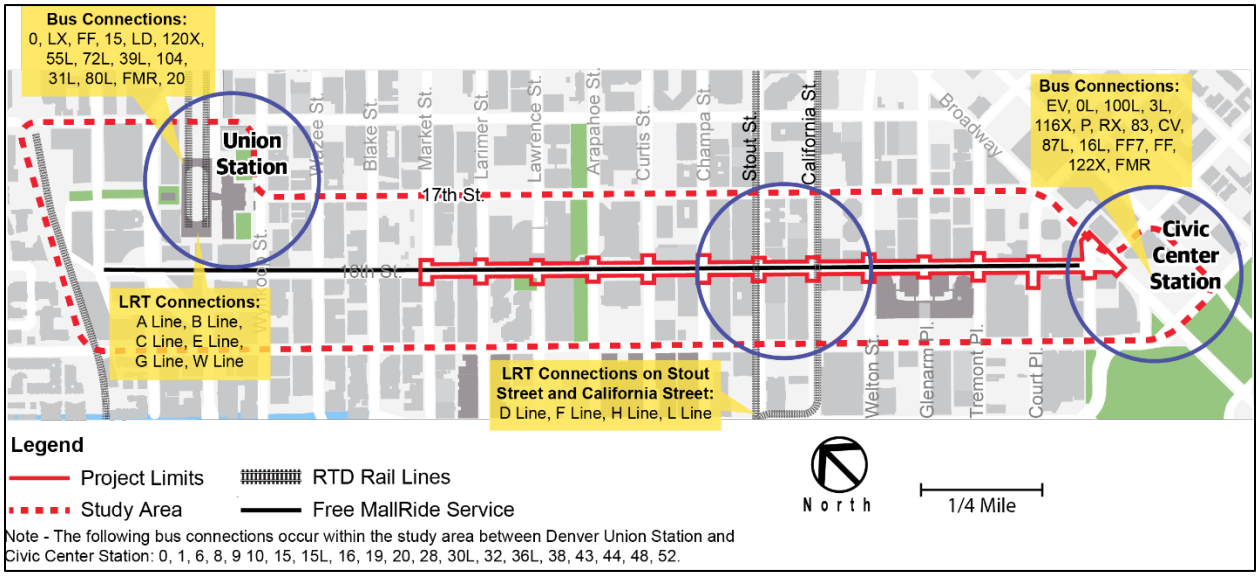
Possible construction scenarios have been postulated to provide a range of conditions that would affect transit operations; it should be noted that the RTD/DRCOG Compass Model travel demand model was not used for this analysis. The cost of changes to route miles associated with possible detours was estimated based on known cost per bus mile of operation. The financial effect of lost ridership was based on operating grant agreements between FTA and RTD.

4.1.3 Existing Conditions

DUS, LRT connections on Stout and California streets, and CCS function as a system to effectively distribute metro Denver transit users accessing the city (**Figure 4-1**). These three connections collectively account for over 88 percent of total daily ridership on the Free MallRide.

In addition to rail service, multiple bus routes feed into the Project area. The Free MallRide is supplemented by the Free MetroRide, which also originates and terminates at DUS and CCS. Detailed information on other transit connections is provided in the *Transit Operations* technical memorandum in **Appendix B**.

Figure 4-1. Key Transit Connections



4.1.3.1 Free MallRide

Background and History

The 1.5-mile Free MallRide was designed as a free transit shuttle bus between the Market Street Station (which no longer exists) and CCS, and was expanded to travel between DUS and CCS, the major bus stations/terminals in downtown Denver (**Figure 4-2**). Placing the Free MallRide service on the Mall decreased the number of buses on 16th and 17th streets by funneling express and regional commuter buses to bus terminals. Routes along the Mall eliminate approximately 870 bus trips on downtown streets, reducing congestion in the downtown area (Marsella, 2008, pers. comm.).

Figure 4-2. Free MallRide Alignment

Transit Connections are Important

According to a survey conducted for RTD by BBC Research and Consulting in 2012, 70 to 80 percent of Free MallRide passengers are also revenue passengers. Riders may transfer from an RTD bus or the LRT before riding the Free MallRide, transfer to an RTD bus or the

LRT after riding the Free MallRide, or have an RTD Eco Pass, Monthly Pass, or Student Pass (BBC, 2012).

Fleet

The Free MallRide vehicle fleet has recently been replaced with 36 fully electric, low-floor shuttle buses with a maximum capacity of 90 passengers (**Figure 4-3**). The new electric shuttles are highly efficient and produce zero point source emissions. Because the new Free MallRide shuttles operate in a pedestrian environment, they offer unique features setting them apart from other RTD vehicles. The operator cabin is located on the right-hand side of the new shuttles and the floors are low and flat. Four wide doors provide easy and quick boarding. However, because of these characteristics, the new electric shuttles are not designed to operate off the Mall, on city streets.

Figure 4-3. Electric Free MallRide Shuttle Bus

Financial Considerations

The RTD cost information database *Service Performance 2016* (RTD, 2018) includes the cost per boarding of its bus and rail services. The most recent year average bus cost, including labor, materials, maintenance, and depreciation, was $5.19 per boarding for rides on routes serving the CBD and $5.54 for bus rides system-wide. By comparison, the Free MallRide cost was $1.04 per boarding. The Free MallRide cost per boarding is lower because of the much higher number of boardings—nearly 190 boardings per hour on the Free MallRide, versus approximately 30 boardings per hour on routes serving the CBD. The total annual cost for the Free MallRide was $12.3 million, and the system carried 11.8 million boardings.

As noted in **Section 1.2.2.1**, transit way maintenance costs have steadily increased over the years. 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 is approaching $1.3 million, and future costs are projected to increase. 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.

The FTA considers the Mall to be a “fixed guideway,” which affects the federal funding RTD receives as reimbursement for its operational funding. That is, it is funded on the same basis (annual passenger miles [APM]) as is their LRT and commuter rail operations. The proportionate (Free MallRide APM/total APM) share of FTA funding attributed to the Free MallRide equals about $500,000 per year. This FTA funding helps keep the Free MallRide free of cost to its tens

of thousands of daily patrons. This is important to the analysis of transit operational impacts. For example, if the Project construction requires a bus detour off the Mall, RTD would get no financial support for the associated passenger miles.

Free MallRide Service Plans

RTD runs three different service plans on the Mall, based on the day of the week: there are Weekday, Saturday, and Sunday/Holiday schedules. In the January 2016 Runboard, the Free MallRide started running at 4:59 a.m. on weekdays, 5:30 a.m. on Saturdays, and 6:30 a.m. on Sundays and holidays. Service continued throughout the day, with the last complete round-trip of the night starting at 1:21 a.m. from DUS. The service frequency ranged from every 90 seconds to every 15 minutes, based on the time of day. On average, there are 458 trips on the weekdays, 205 on Saturdays, and 184 on Sundays. The Free MallRide shuttles ran approximately every 90 seconds to 3 minutes during the following high ridership time periods (RTD, 2017a):

- Morning peak period: 6 a.m. - 9 a.m.
- Lunch: 11 a.m. - 1 p.m.
- Evening peak period: 4 p.m. - 6 p.m.

Under normal operations, the Free MallRide stops at each block.

As noted in **Section 1.2.2.3**, the increasing frequency of maintenance activities on the Mall, resulting from deteriorating Mall infrastructure, slows down Free MallRide service and reduces transit mobility on the Mall.

Current Ridership by Peak Hours, and Day of Week

The average weekday ridership for January 2016 was 38,760 (lower than in prior years because of construction activities at CCS) (**Table 4-1**). The average Saturday ridership was 21,708, with 14,724 for the average ridership on Sundays and holidays. **Table 4-2** presents weekday ridership by time of day. In general, the midday and evening timeframes are the busiest.

Table 4-1. Daily Ridership, Weekday vs Weekend

Schedule	Average Daily Ridership
Weekday	38,760
Saturday	21,708
Sunday	14,724

Source: RTD, 2017a

Table 4-2. Weekday Ridership by Time Period

Time Period	Time	Average Ridership
A.M. Peak	6 a.m. - 9 a.m.	6,552
Midday	9 a.m. - 3 p.m.	16,023
P.M. Peak	3 p.m. - 6 p.m.	10,775

Source: RTD, 2017a

Boarding and Alighting by Stop

The end-of-line stops, CCS and DUS, have the highest daily boardings and alightings (**Table 4-3**). The stops at the LRT stations on California and Stout streets also have a high level of activity, and the stop at Wynkoop Street also provides significant ridership. These five connections account for approximately 88 percent of total daily riders; stops other than these account for only 12 percent of total ridership.

Table 4-3. Boarding and Alightings by Stop

Stop	Boardings	Alightings	Total	Percent
CCS	4,977	3,911	8,888	23
DUS	4,468	3,927	8,395	22
16th/Stout St.	2,892	4,308	7,200	19
16th/California St.	2,805	2,578	5,384	14
16th/Wynkoop St.	2,134	2,370	4,505	12

Source: RTD, 2017a

Future Ridership

RTD developed ridership forecasts for the Free MallRide and Free MetroRide using the RTD trip-based travel demand model (Compass 5.0). **Table 4-4** shows the ridership forecasted for horizon year 2035 using the Denver Regional Council of Governments socioeconomic datasets from December 2016.

Table 4-4. Projected Ridership, Free MallRide and Free MetroRide

Route	2016	2035	Annual Growth (percent)
Free MallRide	38,760	70,400	4
Free MetroRide	2,600	6,600	8
Total	41,360	77,000	4

Source: RTD, 2017a and 2017b

4.1.3.2 Free MetroRide

RTD added a second shuttle bus service, the Free MetroRide, in downtown Denver with the opening of the DUS bus concourse in 2014. The second downtown shuttle bus service was included in the FasTracks Program to help alleviate peak period crowding on the Free MallRide that was forecast with the addition of the new rail and bus rapid transit corridors. With limited stops between DUS and CCS, the Free MetroRide's alignment along 18th and 19th streets provides a travel option to the Free MallRide (**Figure 4-2**) during peak periods. The 18th/19th street alignment was selected in 2005 through the *Downtown Multimodal Access Plan* (CCH et al., 2005) because it provides a direct connection to over 55 percent of the employment in downtown. The daily ridership of 2,600 is modest compared to the Free MallRide; the lower ridership may be attributed to its fewer stops, travel in general purpose lanes, and restricted period of operation (**Table 4-4**).

As it currently operates, the Free MetroRide is intended mainly to transport downtown commuters. The service runs during weekday rush hours (that is, from 5 a.m. to 9:08 a.m. and 2:30 p.m. to 6:35 p.m.) and provides convenient connections to buses, the LRT, and commuter rail. The Free MetroRide could be considered to function as an alternative service to the Free MallRide and as a mitigation measure during the construction of the LPA.

Service Plan

The Free MetroRide makes 14 stops on 18th and 19th streets during each round trip between DUS and CCS. The stops and time schedule are is included in the *Transit Operations* technical memorandum in **Appendix B**.

Financial Considerations

The Free MetroRide service cost $0.98 per passenger boarding in 2016. Total annual costs in 2016 for the Free MetroRide were $546,500, with 557,005 boardings.

4.1.4 Impact Evaluation

4.1.4.1 No Build Alternative

Transit service on the Free MallRide, the Free MetroRide, and other bus and rail services would remain unchanged with the No Build Alternative. As occurs today, unplanned maintenance of the Mall pavement system would continue to periodically disrupt the operation of the Free MallRide. The extent of these disruptions on future service has not been quantified but would likely increase with time as the Mall paver system deteriorates further.

4.1.4.2 Locally Preferred Alternative

Short-term Direct and Indirect Construction Impacts

Project impacts would be limited to the construction phase and would be short-term and direct. There would be no short-term indirect construction impacts to transit. The extent of the construction impacts would be highly dependent on the means and methods deployed by the construction contractor.

This EA considers four possible approaches to construction phasing to demonstrate the possible extent of impacts. RTD prefers phasing Option 1 and Option 2, both of which would retain Free MallRide service on the Mall throughout construction. The approaches described here are not final; each of these, as well as possible similar approaches, would be evaluated further as more Project information is available. However, they serve as bookends for assessing a range of likely impacts. From least to greatest impact on transit ridership and operations, the following options have been considered:

- **Option 1: Retain Shuttle Service within the Mall Right-of-Way during Construction.** Two-way transit service would be maintained on the Mall during construction by shifting the transit guideways south and north within the Mall right-of-way. It is assumed to result in a prolonged construction schedule and higher construction cost. For the purpose of this analysis, a 3.5-year construction period was assumed.
- **Option 2: Construct Mall in One- to Two-block Increments with Contra-Flow Shuttle Operation.** The Project would be segmented in one- or two-block construction packages, and transit service would remain on the Mall. The block under construction would operate

as a single-lane guideway with bi-directional service (buses going in each direction on one lane, timed to avoid collision). With a two-block construction package, flaggers would be required. This option is expected to have a construction schedule and cost impact more favorable than Option 1. For the purpose of this analysis, a 3-year construction period was assumed.

- **Option 3: Construct Mall in Three- or More Block Increments with Detour.** The Project would be segmented into three or possibly more block construction packages, and Free MallRide transit service would be detoured to adjoining streets (most likely 15th and 17th streets). Headways would be reduced from 1.5 to 3.0 minutes during the peak morning and evening periods. Supplementary service would be provided on the Free MetroRide as mitigation to anticipated lost ridership on the Free MallRide. It is probable that flaggers would be required to operate the detour. This option is expected to have a construction schedule and cost impact lower than Options 1 and 2. For the purpose of this analysis, a 2.5-year construction period was assumed.
- **Option 4: Relocate Transit Operations during Construction.** The Free MallRide service would be taken off the Mall during construction and replaced by another parallel service, such as a modified operation of the Free MetroRide on 18th and 19th streets. This analysis assumed operation on 18th and 19th streets, but other parallel streets could also be considered, each with their own set of challenges. Two sub-options were considered: Sub-option A assumes that the buses would operate in a mixed flow, and Sub-option B considers dedicating a traffic lane for buses only. This option is expected to result in the shortest construction schedule. For the purpose of this analysis, a 2.5-year construction period was assumed.

There are many permutations of these four options; all have pros and cons regarding cost, time, impacts to transit ridership and the community. The contractor would incorporate the construction discipline into the final design of the Project, allowing creative approaches to reduce impacts and likely improve on the concepts discussed previously. The resulting recommendation would be endorsed through a PMP and TMP process as described in **Section 4.1.5**.

The possible short-term, direct, and indirect construction impacts anticipated with each theoretical phasing option are summarized in **Table 4-5**. Assumptions for capital cost impacts are detailed in the *Transit Operations* technical memorandum in **Appendix B**. A negligible impact on other localized downtown bus routes and LRT service is possible during construction under all phasing options. However, no additional impacts are expected to RTD's regional transit service during the construction of the LPA.

Option 1: Retain Shuttle Service within the Mall Right-of-Way during Construction. The short-term construction impacts to annual transit ridership on the Free MallRide for Option 1 would likely be less than Options 3 and 4 but comparable to Option 2. There would be no change in the Service plan under this option, meaning that the number and size of shuttles per day, hours of operation, and stops would stay the same. It is anticipated that the travel time from DUS to CCS during construction would be comparable (within 5 percent) to the current operation.

However, construction would take place over multiple blocks at a time, increasing rider confusion and complicating pedestrian flow to undetermined levels. This level of uncertainty is

expected to affect access to the system, resulting in an estimated 15 to 20 percent annual reduction in ridership as compared to the 10 to 15 percent erosion of ridership experienced during the construction of DUS and CCS. This level of ridership erosion is expected to have a negligible impact on sales tax generation from businesses along the Mall.

The potential short-term impact to people with disabilities would also be somewhat greater than experienced during the construction of DUS and CCS. This option is assumed to require approximately 1 additional year (3.5 years versus 2.5 years for other options) for construction and would prolong rider confusion and inconvenience the general public and people with disabilities.

This option is anticipated to result in a potential loss of 15 to 20 percent of total FTA operational grant funds associated with fixed-guideway funding, estimated at $75,000 to $100,000 annually. This is directly proportionate to the projected losses in annual ridership. The anticipated additional 1 year of construction is estimated to result in a capital cost penalty of $15 to $20 million. Further, if the lost ridership is mitigated through additional service on the Free MetroRide, the cost would be $1.8 to $2.5 million per year in added operational cost to RTD. This option would have no other regional construction impacts to RTD's bus, LRT, or commuter rail service. From a transit operations standpoint, RTD prefers Options 1 and 2 to Options 3 and 4.

Option 2: Construct Mall in One- to Two-Block Increments. The short-term construction impacts to transit operations would be similar to that of Option 1, because the number of daily shuttles and hours of operation would remain unchanged. The only change would be that two to three shuttle stops would be temporarily closed to accommodate construction, and there would be disruption to the Mall pedestrian flow in the area where the work is being completed. The tradeoff, when compared to Option 1, is that construction for Option 2 would be contained to a smaller work area of one to two blocks, perhaps offering the advantage of concentrating pedestrian confusion and flow. This advantage is expected to largely offset the loss of the two to three shuttle stops. In this case, a construction approach limiting the closure to two stops is preferred. In evaluating travel time, it is anticipated that the trip from DUS to CCS would remain within 5 percent of the current 15 minutes.

Considering the closure of two to three stops and the general confusion associated with the single-lane bi-directional operation, the loss of ridership is estimated to be similar to the 15 to 20 percent associated with Option 1. Analogous to Option 1, this level of ridership erosion is expected to have a negligible impact on sales tax generation from businesses along the Mall.

Because of the assumed 3-year timeline, the construction cost, ridership loss, or FTA fixed-guideway funding and mitigation cost for replacement transit service are also assumed to be somewhat more favorable than Option 1. Again, there are no indirect operational impacts to RTD regional transit operations attributed to Option 2. From a transit operations standpoint, RTD prefers Options 1 and 2 to Options 3 and 4.

Table 4-5. Summary of Impacts by Phasing Option

Option	Travel Time	Number of Stops (Mall)	Ridership Losses[a] (percent)	FTA Grant Funding[b]	Impact to ADA	Impact to RTD Fleet	Impact on Regional Transit	Schedule (Years)	Added Capital Cost (millions)	Bus Service Mitigation Cost (millions per year)
1	Negligible	No change	15 to 20	$75,000 to $100,000	Negligible	None	Negligible	3.5	$15 to $20	$1.8 to $2.5
2	Negligible	Reduced by 2 to 3	15 to 20	$75,000 to $100,000	Loss of access to 2 to 3 stops	None	Negligible	3.0	$13 to $17	$1.8 to $2.5
3	Increase by 2 to 3 minutes	Reduced by 3 to 4	30 to 40	Up to $200,000/year	Loss of access to 3 to 4 stops	Bus acquisition may be required	Negligible	2.5	None	$4.0 to $5.0
4A	Substantial increase during peak periods	All stops are removed from Mall	All ridership removed from Mall	$500,000/year	No access to Mall	Bus acquisition is required	Reduction in efficiency	2.5	None	Free MallRide shut down; budget directed to Free MetroRide
4B	Negligible due to dedicated bus lane	All stops are removed from Mall	All ridership removed from Mall	$500,000/year	No access to Mall	Bus acquisition is required	Negligible	2.5	None	Free MallRide shut down; budget directed to Free MetroRide

[a] RTD experienced 10 to 15 percent ridership losses during the construction of DUS and CCS.

[b] RTD receives $500,000 per year from FTA for fixed-guideway funding.

Option 3: Construct Mall in Three- or More Block Increments with Detour. The operational impacts for Option 3 are different and greater than for Options 1 and 2 because a detour is required. It is anticipated that peak service headways would need to be reduced from 90 seconds to 3 minutes, and travel times would likely increase by 2 to 3 minutes because of the additional two blocks of travel required in each direction. In addition, three to four stops would be temporarily eliminated, and no additional stops would be provided on the detour. It is therefore estimated that annual ridership would erode by 30 to 40 percent with Option 3. This level of ridership erosion is expected to result in an unquantified loss of sales tax generation from businesses along the Mall.

For the purposes of this analysis, it is anticipated that supplementary service would be provided on the Free MetroRide by augmenting its service plan, including shorter headways and longer hours of service, especially mid-day and weekend service. During the refinement of mitigation, it is possible that supplemental bus service on 15th and 17th streets may also prove to complement replacement service on the Free MetroRide.

The detour has the advantage of moving transit operations away from the construction area, allowing a construction schedule anticipated to be 6 months to 1 year shorter than Option 2 and Option 1, respectively. The shorter schedule would save capital cost, interest payments, and inflation costs. One tradeoff is that people with disabilities would have less access to the Mall during the assumed 2.5-year construction period. Alternate accommodations to people with disabilities would need to be addressed in the TMP.

While not designed for operation off the Mall because of their right-hand driving position, the new electric shuttles could maneuver the required detour. It is assumed that the current number of electric shuttles would be sufficient to operate the detour, avoiding the need to purchase additional vehicles. However, the need to supplement service on the Free MetroRide may require additional buses. RTD does not have spare buses for this purpose and the bus procurement process could introduce delays into the construction schedule. The cost of supplementing service on the Free MetroRide is estimated at $4 to $5 million per year. Possible losses of FTA operating funds for fixed-guideway transit with detours could be as much as $200,000 per year.

Option 3 would have no other short-term indirect construction impacts to RTD's regional transit system.

Option 4: Relocate Transit Operations during Construction. Movement of shuttle operations off the Mall right-of-way simplifies and expedites construction as described under Option 3. For the purposes of this analysis, it is anticipated that the Free MetroRide would provide the majority of replacement service for the Free MallRide. During the refinement of mitigation, it is possible that supplemental bus service on 15th and 17th streets may also prove to complement replacement service on the Free MetroRide. Two sub-options were considered for Option 4: Sub-option A assumes that buses would travel in mixed flow on 18th and 19th streets, with the general traffic, while Sub-option B specifies that a traffic lane on 18th and 19th streets would be dedicated to bus use. In both cases, the existing Free MetroRide service plan would be augmented to carry the Free MallRide patrons. This would include more stops, more aggressive headways, and extended hours of operation. The following provides impacts common to both sub-options, with impacts specific to each sub-option provided in the subsequent paragraphs.

Issues Common to both Sub-options. The impact of transit operations and ridership would depend on the extent to which the current Free MallRide service plan is retained. With either sub-option, businesses on the Mall would no longer be served by transit and people with disabilities would no longer have access to the Mall. The removal of transit patrons from the Mall is expected to have a negative but unquantified impact on sales tax generation from businesses located there.

Further, the electric shuttles used for the Free MallRide are not ideally suited for exclusive city street operation. Option 4 would require the acquisition of additional buses, measured in millions of dollars, for operation of the new temporary service, or the elimination of other services to obtain the required fleet. Bus procurement could introduce delays into the construction schedule. Both sub-options would also place more buses on the downtown streets, offsetting the original intention of the Free MallRide service to remove transit vehicles and reduce congestion in Central Denver. In addition, none of the Free MallRide fixed-guideway passenger miles would be eligible for FTA operational funding, resulting in a loss of approximately $500,000 per year in assistance.

Sub-option A, Mixed-flow Operation. If the relocated transit service operates in a mixed-flow pattern on 18th and 19th streets, travel times would likely be much longer due to traffic congestion, with a significant reduction in ridership. It would not be possible to accommodate the 39,000 riders per day provided on the Free MallRide, resulting in a loss of transit users during the assumed 2.5-year construction period. The extent that these patrons would use other bus transit or walk to their destinations is not known. As a result, there would be a temporary loss on an effective transit connection between DUS, the LRT on Stout and California streets, and CCS. The more widespread impact of this sub-option on regional transit cannot be quantified with the current level of information. Traffic congestion would also be significantly increased, especially during the morning and evening peak periods. This could result in public opposition and offset one of the original goals of the Free MallRide, to reduce bus-related traffic congestion.

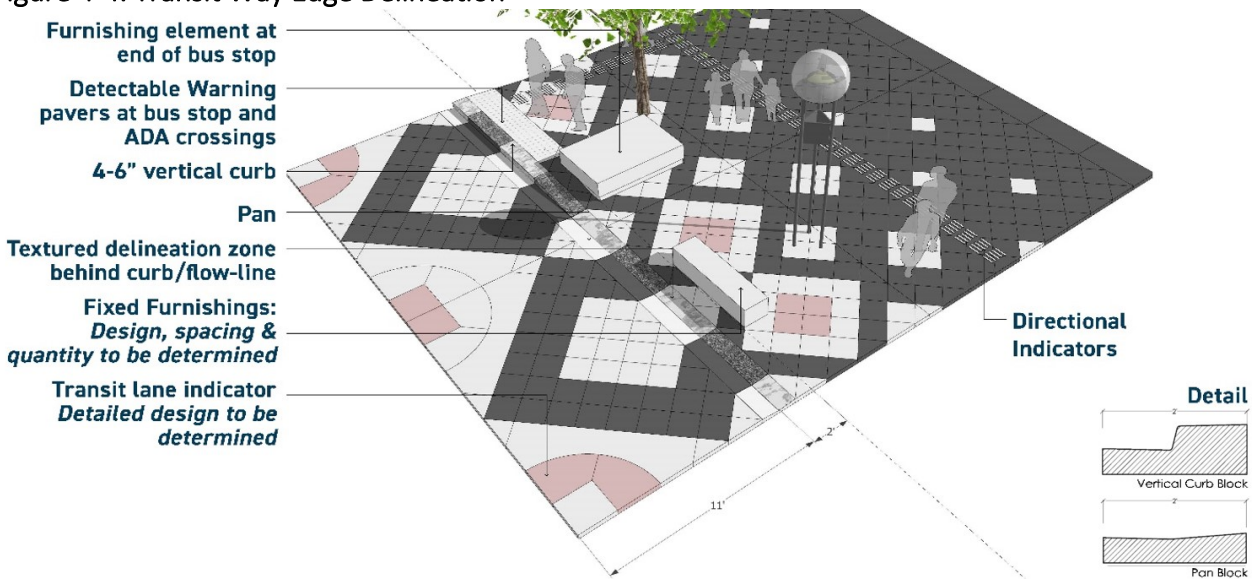
Sub-option B, Dedicated Lane. Dedication of a travel lane could represent an effective temporary alternate connection between DUS, the LRT on Stout and California streets, and CCS. End-to-end travel times and ridership could be comparable to the Free MallRide. However, persons alighting from the Mall between DUS and CCS would have further walk distances to access the system. This could reduce transit ridership. Somewhat offsetting the increased walk distance, if the number of stops was reduced to every other block, the travel times would be faster, benefiting transit ridership. The key disadvantage to this concept is that the loss of one lane for general traffic on 18th and 19th streets would result in high peak hour traffic impacts to the remaining lanes. If the dedicated bus lane requires the acquisition of on-street parking, business access would be affected (**Section 4.2**). The extent of traffic impact would be substantial.

Long-term Direct and Indirect Impacts

Both the existing asymmetrical blocks and the existing median blocks have a vertical curb (consisting of a 2-foot-wide linear element in the pavement pattern) on the outside of each transit-way lane and a pan (also consisting of a 2-foot-wide linear element in the pavement pattern) on the inside of each transit-way lane. Under the LPA, the edge of the transit way

would be defined by a vertical curb at shuttle stops and a pan everywhere else within the same 2-foot-wide linear pavement pattern, so Free MallRide shuttles would operate within the linear elements of the pattern. The LPA would also include a transit lane indicator in the transit way to help guide the shuttle drivers. The transit way indicator technique will be decided in subsequent design phases and be consulted on under Section 106. **Figure 4-4** illustrates methods of delineating the transit way**.**

Figure 4-4. Transit Way Edge Delineation



The proposed design of the transit way would not represent a long-term impact on the operations of the Free MallRide, as the current service plan would remain in place after Project construction and boarding and alighting would occur as they do today. The height for boarding and alighting shuttles would continue to be 10 inches with a vertical curb at the shuttle stops. The LPA would comply with APTA 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. Additionally, the pan would not represent a long-term impact on operations as the pattern will produce an edge for the transit way that would be emphasized by fixed furnishings that produce a visual guide.

The LPA would use an increased-friction pavement surface, which would improve Free MallRide operation and improve the lack of traction that hinders Free MallRide operation on the existing pavement system. Further, the LPA would provide a small 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. Additionally, fixed furnishings in the amenity zone would provide a physical barrier between the transit way and pedestrian areas should a shuttle exit the transit way.

Under the LPA, the lane transitions between symmetrical and asymmetrical blocks would be easier for transit operators to drive through than under the No Build Alternative. Currently the westbound transit-way lane shifts 16 feet between the symmetrical and asymmetrical blocks; the eastbound transit-way lane does not shift. Under the LPA both transit-way lanes would shift 4 feet, making the transitions between block types easier for transit operations.

The reconstructed Mall infrastructure would include installation of new granite pavers with improved surface friction, and the new pavers would be arranged and secured on a 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, reducing or eliminating the frequent paver damage and replacement currently caused by trapped moisture in the pavement system. The combination of improved surface friction and reduced maintenance frequency would improve transit operations and mobility on the Mall.

4.1.4.3 Locally Preferred Alternative Design Option

The LPA Design Option would result in the same impacts to transit operations as the LPA, except both transit-way lanes would shift 6 feet between symmetrical and asymmetrical blocks. Like the LPA, this would make the transitions between block types easier for transit operations. The improvement would be greater under the LPA than under the LPA Design Option because the shift would be 2 feet less, creating a more seamless transition.

4.1.5 Mitigation

CCD will develop a general performance specification outlining general goals and guidelines for the maintenance of transit operations on the Mall during construction. CCD, in coordination with RTD, DDP and the contractor, will prepare and implement a TMP that will include a plan for minimizing and mitigating impacts to transit service during construction. As an example, the TMP should address mitigation measures that do the following:

1. Maintain the current Free MallRide Service Plan (number of shuttles, headways, and stops) to the extent possible
2. Preserve the DUS to CCS travel times to near the current 15 minutes
3. Provide alternative transit service to make up losses of service on the Free MallRide; for example, expanded service on the Free MetroRide to fill the void if needed
4. Assure access for people with disabilities equal to what is provided on the Free MallRide today
5. Maintain access to the Stout/California LRT couplet and DUS and CCS stations
6. Coordinate with RTD on rail replacement
7. Provide safety measures associated with slips, trips, and falls to transit patrons traversing areas affected by construction
8. Avoid the need to acquire additional buses for operation
9. Minimize impacts to on-street parking

CCD will ensure the contractor implements the PIP, which will include measures referenced in **Section 3.1**.

Table 4-6 shows the LPA's anticipated impacts to transit operations, and their potential mitigation. The LPA Design Option would not have adverse effects that would require mitigation beyond what is described for the LPA.

Table 4-6. Summary of Adverse Impacts and Mitigation Commitments for the LPA: Transit Operations

Impacts	Mitigation
Direct Impacts • No adverse long-term impacts to Free MallRide operations are anticipated under the LPA. **Indirect Impacts** • No significant, adverse long-term impacts are anticipated under the LPA. **Temporary Construction Impacts** • Temporary construction impacts are based on a range of options for Free MallRide transit service during construction. RTD prefers options that would retain Free MallRide service on the Mall throughout construction. The approaches described in this EA are not final; construction phasing would be evaluated as design and construction planning progresses with consideration to mitigation of impacts. • The range of impacts for the Free MallRide transit service options during construction are as follows: – Increase in travel time: negligible to significant – Stops removed from the Mall: from two to three stops to all stops removed – Ridership loss along Mall and to the RTD system: 15 to 100 percent – FTA grant funding loss: $75,000 to $500,000 per year – Impact to RTD users, including people with disabilities: none to full interruption in direct Mall access via the Free MallRide – Impact to RTD fleet: none to requirement for new bus acquisitions for detours – Cost to provide transit service during construction: $1.8 million to $5.0 million per year, or temporarily reconfiguring bus operations through Downtown	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • CCD, in coordination with RTD, DDP, and the contractor, will prepare and implement a TMP that will include a plan for minimizing and mitigating impacts to transit service during construction. • CCD will ensure the contractor implements the PIP, which will include the following outreach strategies to inform stakeholders about construction-related issues such as impacts to transit operations: – Issue construction updates and post them on the Project website. – Provide advance notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings to receive input for proposed options. – A public information line of communication will be established and available to field public comments and complaints during construction – Prepare materials with information about construction. – Address property access issues. – Assign staff to serve as liaisons between the public and contractors during construction.

4.2 Traffic Operations

4.2.1 Laws, Regulations, and Orders

The FTA Office of Planning and Environment provides guidance requiring the assessment of the effects of a project on the local and regional transportation system, including road traffic patterns and volumes.

4.2.2 Methodology

The Project's impacts to traffic operations are anticipated to be limited to the construction phase because it has been agreed that RTD's service plan for the Free MallRide will remain unchanged after the updating and reconstruction of the Mall. Several construction scenarios would affect adjacent streets with the addition of Free MallRide shuttles during detours. The extent of the impact would depend on construction phasing and associated maintenance of traffic (MOT) for transit service and delivery vehicles.

Four possible construction scenarios have been postulated to provide a range of conditions that would affect traffic operations. The expected impacts to traffic have been developed based on an estimate of transit service detouring onto adjacent streets and on potential changes in delivery-vehicle circulation.

4.2.3 Existing Conditions

4.2.3.1 Vehicular Operations

Figure 1-1 (Page 1-2) shows the streets within the Project study area. The primary streets that could be impacted during construction include 15th and 17th streets and the area cross streets, between and including Market Street and Broadway. These cross streets vary from two-way, two-lane streets to one-way, four-lane streets. Most streets have parallel parking on one or both sides. 15th Street is a one-way westbound street that varies from three to four lanes, with turn lanes at some intersections. 15th Street has a protected bicycle lane east of and a shared bicycle lane west of Lawrence Street. 17th Street is a one-way eastbound street with four lanes between Market Street and Tremont Place, parking that varies between blocks, and turn lanes in some locations. Between Tremont Place and Broadway, 17th Street has five lanes.

4.2.3.2 Deliveries to businesses on the Mall

The Mall is closed to vehicular traffic other than the Free MallRide, except for emergency, maintenance and delivery vehicles and access to a parking garage between Court Place and Cleveland Place. Delivery access to businesses on the Mall is from cross streets, from alleys to the back of buildings, and, through non-vehicular means, from the Mall.

4.2.4 Impact Evaluation

4.2.4.1 No Build Alternative

Traffic operations within the study area would remain unchanged under the No Build Alternative; therefore, this alternative would have no impact on traffic operations.

4.2.4.2 Locally Preferred Alternative and Locally Preferred Alternative Design Option

Short-term Direct and Indirect Construction Impacts

The LPA and LPA Design Option would result in short-term impacts to traffic operations in downtown Denver related to construction activities in and adjacent to streets and the possible addition of Free MallRide transit service on streets other than the Mall during detours.

For the purposes of this EA, four possible approaches to construction phasing have been considered to demonstrate the possible extent of impact. The four scenarios are described in **Section 4.1**, and range from maintaining transit service on the Mall throughout construction (Options 1 and 2) to detouring transit service off some or all of the Mall during construction (Options 3 and 4). These approaches, along with other construction phasing options, will be evaluated further as more Project information is available.

The possible short-term construction impacts anticipated with each construction phasing option are summarized in **Table 4-7**.

Table 4-7. Summary of Traffic Impacts by Construction Phasing Option

Option	Impacts to Parallel Street Operations	Impacts to Mall Deliveries
1	Negligible	Delivery times may be impacted.
2	Negligible	Delivery times may be impacted.
3	Increase in travel times during peak hours (15th and 17th streets)	Delivery times may be impacted, but for a shorter construction period.
4A[a]	Increase in travel times during peak hours (18th and 19th streets or 15th and 17th streets)	Delivery times may be impacted, but for a shorter construction period.
4B[b]	More significant increase in travel times during peak hours; possible loss of on street parking (18th and 19th streets or 15th and 17th streets)	Delivery times may be impacted, but for a shorter construction period.

[a] Assumes that the Free MallRide detour operations would occur in mixed flow with general traffic.

[b] Assumes that the Free MallRide detour operations would occur in a dedicated lane.

Option 1: Retain Shuttle Service within the Mall Right-of-Way during Construction. Option 1 would have the fewest short-term construction impacts to traffic operations. The specific type of construction occurring on the block of a given business could affect the times available for deliveries to Mall businesses. The duration of these impacts could be significantly longer than for other options because of the multiple construction phases required to keep Free MallRide shuttles on the Mall.

***Option 2: Construct Mall in One- to Two-Block Increments with Contra-Flow Shuttle Operation*.** The short-term construction impacts to traffic operations would be similar to those of Option 1, because transit operations would remain on the Mall. However, the duration of impacts could be longer than Option 1 because of the limited number of blocks available for construction at one time.

***Option 3: Construct Mall in Three- or More Block Increments with Detour*.** This option would have traffic impacts because Free MallRide transit services would be relocated onto a 3- to 4-

block detour. The detour is expected to use 15th and 17th streets because they are the closest streets to the Mall, and they form a one-way pair that would facilitate traffic operations. The specific magnitude of impact will depend on the number of shuttles detoured during peak hours. Observations of existing traffic conditions indicate impacts may be limited to morning and evening peak periods. Impacts to deliveries to Mall businesses will be similar to other options but should be shorter in duration than for Options 1 and 2.

***Option 4: Relocate Transit Operations during Construction*.** This option would also have traffic impacts because the Free MallRide service would be replaced with parallel service, such as a modified operation of the Free MetroRide. This analysis assumes that the service would use 18th and 19th streets, although 15th, 17th, or other parallel streets could also be used. The magnitude of impact will depend on the number of additional buses operating on streets during peak hours, and whether the buses operate in mixed traffic (Option 4A, which would have less impact on peak period traffic congestion) or in a dedicated lane (Option 4B, which would have a greater impact on peak period traffic congestion by reducing road capacity by up to 33 percent depending on the streets used for detours). A parking lane could be used to provide a dedicated transit detour lane, which could reduce traffic impacts, but would reduce an already limited on-street parking supply.

General Short-term Impacts. As previously noted, observations of existing traffic conditions indicate impacts may be limited to morning and evening peaks. Impacts to cross streets would also be expected because of the additional shuttle or bus traffic caused by detours. The duration of the impacts of this option will also be dependent on the construction phasing approach used. Impacts to deliveries to Mall businesses will be similar to other options but should be shorter in duration that Options 1 and 2.

In addition to construction-related impacts caused by transit service detours, intersections within the Project limits would be reconstructed. Lane and intersection closures would reduce road capacity and increase traffic congestion during peak hours. An MOT plan will be developed to address traffic movement across the Mall during the construction phase.

Long-term Direct and Indirect Impacts

The LPA and LPA Design Option are not anticipated to result in long-term impacts to traffic operations, as the current Free MallRide service plan would remain in place after Project construction, and the operational characteristics of intersections of the Mall and cross streets will not change.

4.2.5 Mitigation

CCD, with input from RTD, will develop a general performance specification outlining general goals and guidelines for the maintenance of transit operations on the Mall during construction and weighing those against the impacts to traffic operations. CCD, in coordination with RTD, DDP, and the contractor, will prepare and implement a TMP that will include a plan for minimizing and mitigating impacts to traffic operations during construction. As an example, the TMP should address mitigation measures that minimize impacts to traffic operations and maintain delivery access to Mall businesses.

The TMP will include adequate detours, including advanced notice and signing, and this information will be provided to the public before construction begins. Emergency service

providers will be given adequate detour information, including advanced notice before construction, to ensure reasonable access is maintained during construction. The TMP will include protocols for developing detours and communicating with emergency providers. CCD will also ensure the contractor implements the PIP, which will include measures referenced in **Section 3.1**.

Because the Project is occurring within CCD right-of-way, the Project will be required to receive and comply with a CCD Street Occupancy Permit.

Table 4-8 shows the Project's anticipated impacts to traffic operations, and their potential mitigation. The LPA Design Option would not have adverse effects that would require mitigation beyond what is described for the LPA.

Table 4-8. Summary of Adverse Impacts and Mitigation Commitments for the LPA: Traffic Operations

Impacts	Mitigation
Direct Impacts • No impacts. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Impacts to traffic on 18th and 19th streets, and possibly 15th and 17th streets, due to Free MallRide detours and/or supplemental bus service. • Reduced road capacity and increased traffic congestion during peak hours because of temporary lane or intersection closures within the Project limits. • Temporary impacts to traffic operations in alleys adjacent to the Mall.	**Direct Impacts** • No mitigation required. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • Obtain and comply with CCD's Street Occupancy Permit. • CCD, in coordination with RTD, DDP, and the contractor, will prepare and implement a TMP that will include a plan for minimizing and mitigating impacts to traffic operations during construction. • CCD will ensure the contractor implements the PIP, which will include the following outreach strategies to inform stakeholders about construction-related issues such as impacts to traffic operations: – Issue construction updates and post them on the Project website. – Provide advance notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings – A public information line of communication will be established and available to field public comments and complaints during construction. – Prepare materials with information about construction. – Address property access issues – Assign staff to serve as liaisons between the public and contractors during construction. • The TMP will include adequate detours, including advanced notice and signing, and this information will be provided to the public before construction begins. • Emergency service providers will be given adequate detour information, including advanced notice before construction, to ensure reasonable access is maintained during construction. The TMP will include protocols for developing detours and communicating with emergency providers.

4.3 Pedestrian Facilities

This section focuses on pedestrian facilities and pedestrian mobility. Pedestrian safety is evaluated in **Section 3.4**.

4.3.1 Laws, Regulations, and Orders

Public streets are required to be compliant with the ADA of 1990, which requires facilities be usable and accessible by individuals with disabilities. The DOT issued ADA standards for transportation facilities, including those that provide public transportation services, in 2006. The proposed Public Rights-of-Way Accessibility Guidelines were published in the Federal Register on July 26, 2011; once adopted by the Department of Justice (DOJ), they will become standards under Title II of the ADA. The guidelines cover pedestrian access to sidewalks and streets. Additionally, the FTA also has guidance on complying with ADA standards (2015).

4.3.2 Methodology

A desktop review was performed using pedestrian data from information provided by the DDP and *Downtown Denver 16th St Mall: Small Steps Towards Big Change* (Gehl, 2016) and *Downtown Multimodal Access Plan* (CCD et al., 2005). These sources are used to determine how the LPA and the LPA Design Option would accommodate future pedestrian needs as compared to the No Build Alternative. This section provides an analysis of both construction and operation phases of the Project and associated direct and indirect impacts associate with those phases.

4.3.3 Existing Conditions

The current configurations of the Mall blocks are illustrated in the cross-sections on **Figure 2-1 (Page 2-3)**. The asymmetrical blocks have 18 feet of pedestrian walkways, and the median blocks have 16 feet; 1 foot of sidewalk width can comfortably carry approximately four pedestrians per minute (Gehl, 2016). This results in a carrying capacity of approximately 4,320 pedestrians per hour in asymmetrical blocks and 3,840 pedestrians per hour in median blocks. 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.

CCD and DDP counted hourly pedestrian volumes in 2015 and 2016 in representative locations on the Mall (**Tables 4-9 and 4-10**). Peak hour pedestrian volumes exceed the carrying capacity of the sidewalks on the median blocks on the eastern end of the Mall, hindering pedestrian mobility.

The existing pedestrian walkways are located directly adjacent to the transit-way lanes throughout the Project limits and delineated by a vertical 4-inch curb. Within the median blocks, the median amenity zone is delineated from the transit-way lanes by a pan. The asymmetrical block also contains a median delineated by a pan, but the median is much smaller, and pedestrians do not use the median as a gathering area. The existing pedestrian walkway, vertical curb, pan, medians, and transit-way lanes are all constructed of the same

material and do not provide significant visual or physical cues that separate spaces for pedestrians and the transit way. The lack of strong delineation, coupled with inadequate sidewalk width, contributes to pedestrians walking into the transit ways or immediately adjacent to transit ways, causing the potential for conflicts between pedestrians and shuttles.

Table 4-9. 2015 and 2016 Average Hourly Pedestrian Volumes for Representative Blocks on the Mall

Location	Average Hourly Pedestrian Volumes, Weekdays 10 a.m. – 4 p.m.	Average Hourly Pedestrian Volumes, Sundays 10 a.m. - 4 p.m.
Lawrence to Arapahoe	1,721 pedestrians per hour	1,325 pedestrians per hour
Champa to Stout	2,522 pedestrians per hour	1,848 pedestrians per hour
Welton to Glenarm	2,217 pedestrians per hour	1,731 pedestrians per hour
Court to Tremont	1,544 pedestrians per hour	771 pedestrians per hour

Source: Gehl, 2016.

Table 4-10. 2015 and 2016 Peak Hour Pedestrian Volumes for Representative Blocks on the Mall

Location	Peak Hour Pedestrian Volume Count, Weekdays	Peak Hour Pedestrian Volume Count, Sundays
Lawrence to Arapahoe	2,958 pedestrians per hour	2,016 pedestrians per hour
Champa to Stout	3,870 pedestrians per hour[a]	4,704 pedestrians per hour[a]
Welton to Glenarm	4,146 pedestrians per hour[a]	3,672 pedestrians per hour
Court to Tremont	2,940 pedestrians per hour	3,738 pedestrians per hour

[a] Pedestrian volume exceeding sidewalk capacity.

Source: Gehl, 2016.

Pedestrian volumes are projected to increase in the future as downtown employment, population, and transit ridership grow (forecasts are described in **Sections 3.5.7** and **4.1** and in the associated technical memoranda in **Appendix B**). The forecasted employment growth from 2015-2040 in the downtown area is 0.7 percent annually in the CBD neighborhood and 1.2 percent annually in the DUS neighborhood (**Table 1-4** of the *Land Use and Socioeconomic Existing Conditions* technical memorandum located in **Appendix B**). This is projected to result in future (2040) midday peak pedestrian volumes of 4,800 pedestrians per hour within the CBD and 4,000 pedestrians per hour in the DUS neighborhood. These are generalized projections that may result in higher or more-concentrated volumes of pedestrians for the Mall.

Many pedestrians along the Mall are daily commuters arriving via transit to travel to their place of business. The DDP's 2017 downtown Denver Commuter Survey found 39.3 percent of downtown employees commute via transit; 8.3 percent, via bicycle, and 5.4 percent, via walking (DDP, 2017). Sixty RTD bus routes and eight RTD rail lines serve downtown Denver. The Free MallRide is a critical link in the transit system, serving approximately 39,000 riders every day.

4.3.4 Impact Evaluation

4.3.4.1 No Build Alternative

Under the No Build Alternative, there would be no construction on the Mall and therefore no impacts to pedestrian use. The No Build alternative would not widen the existing walkable areas for pedestrians or accommodate existing and future pedestrian volumes. The projected increase in pedestrian volumes may lead to a worsening of the intensity of potential conflicts between pedestrians and transit vehicles on the Mall. Overcrowded pedestrian walkways can also result in pedestrians avoiding the Mall or being less likely to linger or patronize businesses on the Mall.

4.3.4.2 Locally Preferred Alternative

Short-term Direct and Indirect Construction Impacts

During construction, a TMP would be implemented that provides reasonable pedestrian access to businesses and Free MallRide transit stops. Construction phasing plans may result in detours of the Free MallRide to parallel streets, which could result in two to three additional blocks of out-of-direction travel for pedestrians whose destinations are on the Mall. Construction would not impede pedestrian access to businesses, but it may result in pedestrians avoiding the area because of noise and general visual disruption. Persons seeking restaurants would be less likely to enjoy outdoor seating activities for the duration. During construction, pedestrian-access strategies over or around construction area would comply with all appropriate standards, including those set forth by CCD Department of Public Works.

Long-term Direct and Indirect Impacts

The LPA would widen the pedestrian walkways in all blocks of the Mall within the Project area, accommodating existing and projected future pedestrian volumes and improving pedestrian mobility. A minimum 10-foot-wide pedestrian walkway would be provided on both sides of every block, with a minimum pedestrian capacity of 4,800 pedestrians per hour per block. This width would provide adequate space for future pedestrian mobility and would comply with CCD sidewalk standards. Additionally, the Mall would be reconstructed with an increased friction granite pavement that would reduce slips and falls, increasing mobility.

The LPA would include an amenity zone with fixed furnishings between the transit way and the pedestrian walkway, to minimize the potential for pedestrian/vehicle conflicts, while maintaining the ability to cross the Mall at any location. 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).

Truncated domes would be implemented at designated crossings and would be considered at shuttle stops. Outside of shuttle stop locations, the LPA would construct a pan rather than a vertical curb between the transit way and amenity zone, which would improve mobility for wheelchair users crossing the Mall and improve pedestrian mobility during special events when transit is detoured off the Mall. The LPA would make use of directional indicators at the edges of the pedestrian walkway and a detectable edge consisting of textured changes between the amenity zone and the transit way; these features would assist visually impaired users in wayfinding (**Figure 4-4**). The placement of trees, lights, and other furnishings in the amenity

zone between pedestrian walkway and transit ways would provide the primary separation and the biggest benefit for safety, consistent with national practices and guidance for the separation of pedestrians and transit.

The LPA would bring the Project area into compliance with current ADA standards. Outreach to the ADA/Disability Advisory Committee will continue during subsequent design phases to gather input on delineating features and other components of the design related to accessibility. Additionally, review will take place by a third party to verify the design is ADA compliant.

Equitable and sufficient space for high-quality public gathering is crucial to the continued vitality of the Mall. Providing high-quality public spaces throughout the Mall is key to maintaining the Mall's role as a hub of mobility and economic activity in downtown. Without an equitable and adequate distribution of public gathering opportunities throughout the Mall, the existing deficiencies regarding public use would be perpetuated. Parts of the Mall would be more attractive than others, and the Mall as a whole would be less vibrant. The inequity and deficiencies in public use are most pronounced in the asymmetrical blocks as a result of a lack of amenity zone and trees on the narrow side of those blocks.

The LPA would add an amenity zone with trees, lights, and furnishings to the narrow side of the asymmetrical blocks and preserve patio space on the Mall, consistent with recommendations from the 2016 CCD study of public use on the Mall. The 2016 study found patios, particularly expanded patios, had the largest influence in attracting more people to stay longer on the Mall (rather than merely pass through the Mall) (Gehl, 2016). By preserving patio space, providing wider pedestrian walking areas with better delineation between pedestrians and transit, and providing amenity zones with furnishings for public use on both sides of all blocks, the LPA can provide more appeal to pedestrians, increased staying activity, more equitable distribution of those staying activities, and improved pedestrian mobility on the Mall.

4.3.4.3 Locally Preferred Alternative Design Option

The LPA Design Option would result in the same impacts to pedestrian facilities as the LPA, except the LPA design option would reduce patio/gathering space on the south (narrow) side of the asymmetrical blocks, decreasing patio seating capacity by one-third compared to existing and proposed LPA conditions. The reduced patio space would result in less public use and activation on the narrow side of those blocks. The LPA Design Option would provide the same size pedestrian walkway and amenity zone with trees, lights, and furnishings on the narrow side of the asymmetrical blocks as the LPA, and pedestrian mobility would be improved to the same degree under the LPA Design Option as under the LPA.

4.3.5 Mitigation

CCD, RTD, and DDP will meet with an ADA/Disability Advisory Committee during subsequent design phases to receive input on delineating features and other components of the Mall design related to accessibility. CCD and RTD will establish design criteria during the preliminary design phase. CCD and RTD, in coordination with the contractor, will evaluate design elements like directional indicators and tactile warning strips during the final design phase prior to accepting the design for construction. Additionally, CCD will implement a third-party review to

verify that the design and construction of the improvements complies with ADA requirements, coordinating with RTD to account for RTD's Free MallRide fleet configuration and capabilities.

Measures to minimize disturbance on pedestrians during construction phase will include the following:

- Obtain and comply with a CCD Street Occupancy Permit.
- CCD, in coordination with RTD, DDP, and the contractor, will prepare and implement a TMP that will include a plan for minimizing and mitigating impacts to pedestrian facilities during construction.
- The TMP will include adequate detours, including advanced notice and signing, and this information will be provided to the public before construction begins.
- CCD will ensure the contractor implements the PIP, which will include measures referenced in **Section 3.1**.

Table 4-11 shows the Project's anticipated impacts to pedestrian facilities, and their potential mitigation. The LPA Design Option would not have adverse effects that would require mitigation beyond what is described for the LPA.

Table 4-11. Summary of Adverse Impacts and Mitigation Commitments for the LPA: Pedestrian Facilities

Impacts	Mitigation
Direct Impacts • Changes to the Mall design related to ADA compliance. **Indirect Impacts** • No Impacts.	**Direct Impacts** • CCD, RTD, and DDP will meet with an ADA/Disability Advisory Committee during subsequent design phases to receive input on delineating features and other components of the Mall design related to accessibility. CCD and RTD will establish design criteria during the preliminary design phase. CCD and RTD, in coordination with the contractor, will evaluate design elements like directional indicators and tactile warning strips during the final design phase prior to accepting the design for construction. • CCD will implement a third-party review to verify that the design and construction of the improvements complies with ADA requirements, coordinating with RTD to account for RTD's Free MallRide fleet configuration and capabilities. • ADA access needs with be included in RTD's Safety Certification Process. **Indirect Impacts** • No mitigation required. **Temporary Construction Impacts** • Obtain and comply with CCD's Street Occupancy Permit. • CCD, in coordination with RTD, DDP, and the contractor, will prepare and implement a TMP that will include a plan for minimizing and mitigating impacts to pedestrian facilities, including to people with disabilities, during construction.

Impacts	Mitigation
Temporary Construction Impacts • Temporary limited or detoured pedestrian access on pedestrian walkways.	• The TMP will include adequate detours, including advanced notice and signing, and this information will be provided to the public before construction begins. • CCD will ensure the contractor implements the PIP, which will include the following outreach strategies to inform stakeholders about construction-related issues such as impacts to pedestrian facilities: – Issue construction updates and post them on the Project website. – Provide advance notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings. – A public information line of communication will be established and available to field public comments and complaints during construction. – Prepare materials with information about construction. – Address property access issues. – Assign staff to serve as liaisons between the public and contractors during construction.

4.4 Bicycle Facilities

4.4.1 Laws, Regulations, and Orders

The FTA Office of Planning and Environment guidance states "By definition, any proposed transit project will potentially influence elements of the local and regional transportation system, including…bicycle and pedestrian facilities…", although specific methodology for assessing impacts is not provided (FTA, 2016). The FHWA has a Bicycle and Pedestrian program[5] that includes resources and guidance for including bicycle facilities into projects and minimizing impacts to the existing facilities.

4.4.2 Methodology

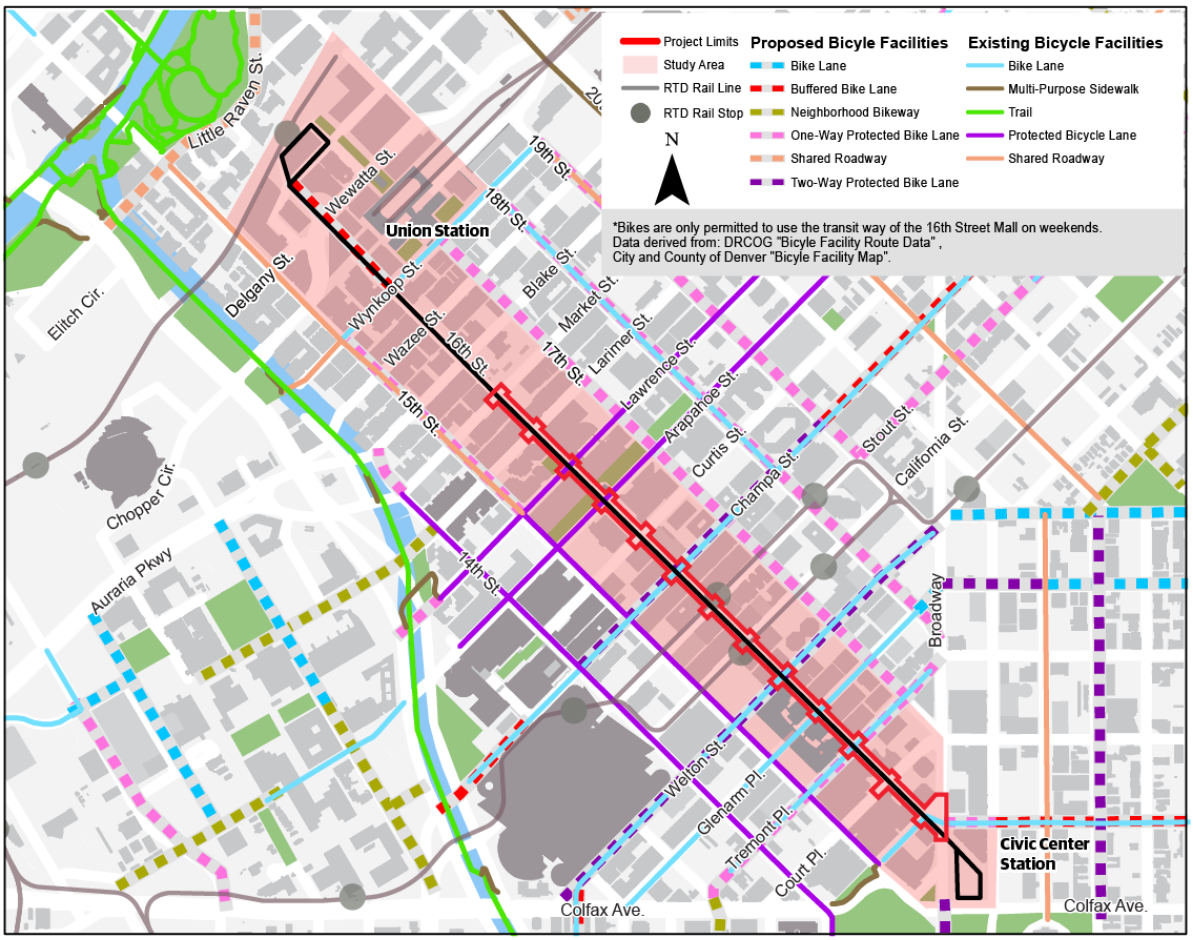
A desktop review was performed using aerial images and information from the DRCOG's *Bicycle Facility Route Data* (2018) and CCD's Bicycle Facility Map (2017c). These sources are used to determine how the LPA and LPA Design Option would accommodate future bicycle needs as compared to the No Build Alternative. This section provides an analysis of both construction and operation phases of the Project and associated direct and indirect impacts associate with those phases.

[5] Federal Highway Administration Bicycle and Pedestrian Program. https://www.fhwa.dot.gov/environment/bicycle_pedestrian/.

4.4.3 Existing Conditions

Except for between Cleveland Place and Broadway, bicycles are an incidental use of the Mall and are restricted to using the transit ways within the Mall on weekends; the transit way is operated as a fixed-guideway facility, which does not allow other modes of travel per federal requirements. Protected bicycle lanes on 14th and 15th streets parallel the Mall, and protected bicycle lanes on Lawrence and Arapahoe streets cross the Mall. Immediately east of the Mall, 16th Avenue provides bicycle lanes in both directions, which connect to the Mall at its intersection with Broadway and then jog across the Mall and down Cleveland Place to 15th Street. Three other bicycle lanes (not protected) cross the Mall on Champa, Welton, and Glenarm streets (CCD, 2017c). Several other bicycle facilities are planned in the Project study area. **Figure 4-5** illustrates the locations of existing and proposed bicycle facilities. There are also temporary bicycle racks located on the Mall to accommodate bicycle trips with the Mall as a destination.

Figure 4-5. Existing and Proposed Bicycle Facilities



4.4.4 Impact Evaluation

4.4.4.1 No Build Alternative

Under the No Build Alternative, there would be no construction on the Mall and therefore no impacts to bicycle use.

4.4.4.2 Locally Preferred Alternative and Locally Preferred Alternative Design Option

Short-term Direct and Indirect Construction Impacts

Mall intersections with cross streets may be temporarily closed during construction, affecting bicycle access via the Lawrence and Arapahoe protected bicycle lanes. It is unlikely both protected bicycle lanes would be closed at the same time, and detours would be possible. In addition, the unprotected bicycle lanes on Champa, Welton, and Glenarm streets, and the connection between the bike lanes on 16th Avenue and 15th Street down Cleveland Place would be affected by intersection closures. Detours would be made available for these routes. Construction may result in short-term limits on the opportunities for bicycles to use the transit ways during the weekends for those portions of the Mall under construction. Construction activities may result in short-term decreased interest in accessing the Mall by bicyclists.

Long-term Direct and Indirect Impacts

No realignments or changes to bicycle lanes or bicycle routes are proposed as part of the LPA or LPA Design Option. Bicycle use on the Mall between Cleveland Place and Broadway will be maintained. Allowing bicycles to use transit ways on weekends would continue. Therefore, neither the LPA nor the LPA Design Option would result in long-term negative impacts to bicycle use to and within the Mall.

4.4.5 Mitigation

Measures to minimize disturbance on bicyclists during construction will include the following:

- Obtain and comply with a CCD Street Occupancy Permit.
- CCD, in coordination with RTD, DDP, and the contractor, will prepare and implement a TMP that will include a plan for minimizing and mitigating impacts to bicycle facilities during construction.
- The TMP will include adequate detours, including advanced notice and signing, and this information will be provided to the public before construction begins.
- CCD will ensure the contractor implements the PIP, which will include measures referenced in **Section 3.1**.

Table 4-12 shows the Project's anticipated impacts to pedestrian and bicycle facilities, and their potential mitigation. The LPA Design Option would not have adverse effects that would require mitigation beyond what is described for the LPA.

Table 4-12. Summary of Adverse Impacts and Mitigation Commitments for the LPA: Bicycle Facilities

Impacts	Mitigation
Direct Impacts • No impacts. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Temporary impacts to bicycle facilities that intersect with the Mall during lane and/or intersection closures. • The Free MallRide transit way is not considered an impacted bicycle facility, as its use as a bicycle facility is incidental.	**Direct Impacts** • No impacts. **Indirect Impacts** • No impacts. **Temporary Construction Impacts** • Obtain and comply with CCD's Street Occupancy Permit. • CCD, in coordination with RTD, DDP, and the contractor, will prepare and implement a TMP that will include a plan for minimizing and mitigating impacts to bicycle facilities during construction. • The TMP will include adequate detours, including advanced notice and signing, and this information will be provided to the public before construction begins. • CCD will ensure the contractor implements the PIP, which will include the following outreach strategies to inform stakeholders about construction-related issues such as impacts to bicycle facilities: – Issue construction updates and post them on the Project website. – Provide advance notice of roadway closures, driveway closures, and utility shutoffs. – Conduct public meetings. – A public information line of communication will be established and available to field public comments and complaints during construction. – Prepare materials with information about construction. – Address property access issues. – Assign staff to serve as liaisons between the public and contractors during construction

SECTION 5

Public Involvement and Agency Coordination

This section provides a summary of Project-related outreach and coordination that supported the NEPA process. The public outreach effort has allowed the public to be involved in the decision-making process and influence the choices to be made. Agency coordination included meetings and workshops with agencies with interest in or jurisdiction over the Project. Agency coordination and correspondence through March 20, 2019 is included as **Appendix C**, and public involvement materials are included in **Appendix D**.

5.1 NEPA Scoping

The agencies conducted scoping activities at the beginning of Project development to identify issues to be studied, document existing conditions, and develop the purpose and need. **Table 5-1** identifies the public and agency involvement activities that were conducted during the scoping period and **Appendix E**, the *Scoping Summary Report*, provides detail on the activities conducted and input received.

Scoping meetings were held to announce the Project and to do the following: gather input on key issues to be addressed by the Project and the draft purpose and need for the Project, define the vision for the Mall within the context of greater downtown Denver, and discuss Project concerns related to social and environmental resources.

Scoping input was used in the development of the Project purpose, needs, and goals, and in the development of evaluation criteria for the subsequent alternatives analysis.

Table 5-1. Scoping Input

Meeting	Dates	Attending
Agency coordination meetings	May 2, 2017; May 18, 2017	Agency staff from RTD, CCD, DDP, and FTA
Small group meetings	June 19, 2017; June 20, 2017	Representatives of special interest, advocacy, and mobility groups; hospitality and tourism; downtown residents and neighborhoods; and property owners and businesses
Stakeholder workshop	June 28-30, 2017	RTD, CCD, DDP, FTA, DURA, BID, SHPO, Historic Denver, Colorado Preservation Inc., Lower Downtown District, Visit Denver, Curtis Park Neighbors, property owners
Section 106 consultation initiation	July 25, 2017	Consulting parties (**Section 5.3**)
Meet in the Street information table	July 22, 2017	Members of the public
Public scoping open house	July 27, 2017	Members of the public

5.2 Alternatives Analysis Coordination

Following scoping, the Project sponsors conducted a two-step alternatives evaluation process and identified an LPA. Agency and public involvement activities occurred during both the Level 1 and Level 2 evaluation steps, as described in **Tables 5-2** and **5-3**, respectively. Level 1 and Level 2 of the Alternative Screening process are summarized in **Section 2.0** and in the *Alternatives Analysis* technical memorandum in **Appendix B**. Agency Correspondence through March 20, 2019 is included in **Appendix C**, and Public Involvement is included in **Appendix D**. Input received during these coordination meetings led to the development of additional alternatives and refinements to alternatives, as described in **Section 2.0**.

Table 5-2. Level 1 Alternative Analysis Public Involvement and Agency Coordination

Level 1 Alternatives Analysis Meeting	Dates	Attending
Section 106 consulting parties meetings	September 6, 2017; September 27, 2017	Consulting parties (**Section 5.3**)
Stakeholder workshop	October 2, 2017	RTD, CCD, DDP, FTA, DURA, BID, DRCOG, SHPO, Historic Denver, Colorado Preservation Inc., Lower Downtown District, Visit Denver, Curtis Park Neighbors, property owners
Small group meetings	October 2, 2017	Representatives of special interest, advocacy, and mobility groups; hospitality and tourism; downtown residents and neighborhoods; and property owners and businesses
Public open house	October 18, 2017	Members of the public

Table 5-3. Level 2 Alternative Analysis Public Involvement and Agency Coordination

Level 2 Alternatives Analysis Meeting	Dates	Attending
Section 106 consulting parties meetings	November 14, 2017; January 11, 2018; February 26, 2018	Consulting parties (**Section 5.3**)
Property owner meetings	January 4, 2018; January 8, 2018	Owners of properties fronting the Mall
Stakeholder workshop	January 16, 2018	RTD, CCD, DDP, FTA, DURA, BID, DRCOG, SHPO, Historic Denver, Colorado Preservation Inc., Lower Downtown District, Visit Denver, Curtis Park Neighbors, property owners
Small group meetings	March 7, 2018	Representatives of special interest, advocacy, and mobility groups; hospitality and tourism; downtown residents and neighborhoods; and property owners and businesses
Public open house	March 8, 2018	Members of the public

5.3 Section 106 Consultation

The Section 106 consultation process for this undertaking was initiated in June 2017. The FTA and RTD held 10 consulting party meetings between June 2017 and December 2018 (inclusive) to discuss the definition of the Project APE; historic properties identified within the APE; the alternatives analysis; the design, materials, trees, and other aspects of the LPA and the LPA Design Option; OAHP Form 1403 for the Mall, which describes the Mall's NRHP-eligibility, character-defining features, and significance (Attachment 2 to the *Cultural Resources Technical Report*, included in **Appendix B**); effects to the identified historic properties from the Project; and appropriate measures to address the adverse effect. The consultation process is ongoing. The ACHP was notified of the adverse effect on July 7, 2018 and invited to participate in the resolution of adverse effects. Via letter dated July 31, 2018, the ACHP notified FTA that they would participate in consultation regarding this Project.

SHPO concurred with FTA's determinations of eligibility and finding of adverse effect via letter received June 20, 2018. Consulting party meetings through December 2018 continued the discussion of appropriate measures to address the adverse effect on the 16th Street Mall historic property. Resolution of the adverse effect will be stipulated in a Programmatic Agreement being developed among SHPO, FTA, RTD, CCD, ACHP, and the consulting parties. The Programmatic Agreement will be executed prior to completion of the NEPA agreement document; a draft of the agreement is included in **Appendix G**.

These are the organizations participating in the Section 106 consultation process.

- 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 Historic District
- Colorado Preservation, Inc.
- Landmarks Preservation Commission
- Advisory Council on Historic Preservation
- 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 consultation materials but is not actively participating in the consultation. No responses were received from the other tribes.

Attachment 3 of **Appendix B** (the Cultural Resources Report) contains a summary of the Section 106 consultation process and correspondence through February 27, 2018. The correspondence through March 20, 2019 is included in **Appendix C** (Agency Coordination).

Historic Denver has been an active participant in the consultation process and proposed a design option to the LPA to retain an area of the Mall with the original design rebuilt in place.

The design team met with Historic Denver on August 9, 2018 and September 11, 2018 to discuss and understand the proposed design changes. The Historic Denver proposal was developed into the LPA Design Option evaluated in this document.

5.3.1 Summary of Consulting Parties Meetings

This section summarizes the topics discussed at each consultation meeting and consulting party comments and concerns. There will be additional consulting party meetings to discuss appropriate measures to address the identified adverse effect, and specific stipulations to include in the Programmatic Agreement.

5.3.1.1 Consulting Parties Meeting No. 1, July 25, 2017

Larry Squires (FTA) and Susan Wood (RTD) opened the meeting and briefly described the Project background and the current status. A presentation provided a summary of previous studies; the proposed problem statement; the proposed purpose and need for the Project; the proposed Project goals; the identified historic property (the Mall); and maps showing the Project limits, study area, and APE. The presentation closed with a Project timeline and Section 106 consultation next steps. Following the presentation, the discussion was focused on the proposed problem statement, purpose and need, and Project goals. There was a lengthy discussion of the differences between Project needs and goals, and the desire of the group to include some language in the problem statement and in the Project needs to reflect the history and significance of the Mall. Other topics discussed included the role Section 4(f) will have in the evaluation, the proposed APE, and next steps. The meeting closed with an announcement about the Project website where all Section 106 materials are posted.

5.3.1.2 Consulting Parties Meeting No. 2, September 6, 2017

This meeting was opened by Larry Squires (FTA) and Susan Wood (RTD). Updated problem and purpose and need statements were presented for which there were no additional comments. Cindy Sanders, CEO and partner with Olin, gave a presentation about iconic pavement design. After the presentation, meeting participants discussed their ideas and definitions of iconic design and how those ideas should be incorporated into the Mall. During this discussion, participants also expressed concern for pedestrian safety and offered opinions on which aspects of the proposed design could be changed without altering the property's iconic feeling. The meeting closed with an announcement of the date for next meeting and the expected subject matter.

5.3.1.3 Consulting Parties Meeting No. 3, September 27, 2017

This meeting opened with an update on the status of the Section 106 consultation process, and it was announced that the Mall was determined eligible for listing in the NRHP. The project team presented the Level 1 alternatives evaluation criteria, proposed alternatives, and alternatives evaluation conclusions, and requested input from the consulting parties. The discussion that followed included comments and concerns over the patio café space being too large, the use of railings around the space, and the desire to see additional alternatives that require less rehabilitation. Additionally, issues concerning the width of shuttles, the replacement of infrastructure, and pedestrian use and safety were discussed. Consulting parties requested additional analysis on pavement replacement materials. A visual study of five potential pavement designs was presented and discussed. Consulting parties recommend

showing an alternative that would include partial changes and showing what could be preserved in which areas, with the goal being to try to preserve as much as possible, rather than assuming a full reconstruction under all alternatives. The meeting closed with an announcement of the date for the next meeting and a summary of items/documentation requested for the next meeting.

5.3.1.4 Consulting Parties Meeting No. 4, November 14, 2017

This meeting was brought to order by Susan Wood (RTD). Ms. Wood reviewed the steps of the Section 106 process and provided an update as to which steps had been completed. Updates to the APE were reviewed, and participants identified additional properties that needed to be updated or reconsidered. Although the Mall has been determined eligible for listing in the NRHP, concurrence with Form 1403 did not occur at the time eligibility was determined. Form 1403 was discussed, and Historic Denver provided comments to be inserted into the form. A timeline for submission of the form was established that included a period for additional comments by consulting parties. Other topics discussed included a Community Input Survey and the development and evaluation of Level 2 alternatives. Participants requested more information on the various alternatives and how the alternatives consider minimization and/or avoidance efforts as per Section 4(f). The meeting concluded with an outline of the next steps as required by Section 106 and requested items and documentation.

5.3.1.5 Consulting Parties Meeting No. 5, January 11, 2018

Susan Wood (RTD) opened the meeting and provided a review of the Section 106 consultation process. Colleen Kirby Roberts (Peak Consulting Group) summarized Project activities to-date. Peak Consulting gave a presentation regarding the design elements of the Level 2 alternatives evaluation. The presentation included a cost evaluation summary for the alternatives evaluated in Level 2 and a summary of the safety data collected. The conclusions from the Level 2 Evaluation are to carry forward the Center Running and New Asymmetrical alternative. The alternatives evaluation also included a discussion of pavement options and the Section 4(f) evaluation. The Section 4(f) evaluation found that there is no avoidance alternative that meets the Project purpose and need. The subsequent discussion was focused on repair and replacement options, safety data, and specific design aspects of the Project. Following this discussion, an updated list of historic properties within the APE was distributed. Additionally, RTD in coordination with the FTA and SHPO, developed a system for establishing NRHP eligibility for properties within the APE that have not been previously evaluated. The process for this system was reviewed at this meeting. General comments and feedback included questions regarding materials, design issues, and local codes and regulations. The meeting closed with a discussion of the next steps required in the Section 106 process and a summary of items/documentation requested for the next meeting.

5.3.1.6 Consulting Parties Meeting No. 6, February 27, 2018

This meeting was opened with an overview conducted by RTD. The project team then provided an overview of proposed capital improvements, including information regarding the alignment and transitions. Additional updates were given on transit and traffic operations, construction activity, pavement materials and pattern, and trees and tree infrastructure. A timeline for construction activities, including Project phasing and access, was presented. Consulting parties voiced concerns about the number of trees used in the design and suggested a study to

determine the viability of retaining, moving, and putting back trees. The project team discussed the big picture intention of maintaining a tree-lined public space that serves pedestrians and public transit service. An update was given on the status of Form 1403 for the Mall. General discussion included comments about the importance of the historic design and character being a focus for the design team, and that agencies and the design team need to provide assurances that historic design elements will be considered throughout the design process. The meeting concluded with a review of items requested during the meeting.

5.3.1.7 Consulting Parties Meeting No. 7, May 3, 2018

The meeting began with an overview from FTA and RTD representatives. The project team presented follow-up information regarding trees and tree infrastructure. This information included an overview of trees, a planting concept, and types of preferred trees. The ensuing discussion centered around the idea of reusing trees and whether or not transplanted trees would respond well after being moved. The project team agreed to conduct a study on the viability of transplanting trees. A summary of public comments was then provided to meeting participants and a discussion of current opportunities and challenges, and potential issues with business vitality, followed. The project team then gave an update on the status and timeline for Section 106 consultation activities and an overview of the LPA. The important issues for the LPA include: paving/pattern, planting, alignment, lighting, other features, curb design options, and impacts to historic properties. The meeting concluded with a summary of the next steps required by the Section 106 process.

5.3.1.8 Consulting Parties Meeting No. 8, June 16, 2018

This meeting opened with a review of recent activities and a summary of the Section 106 consultation process to-date. Meeting participants discussed unresolved design issues including whether or not a curb should be used, and further discussion of the design details of the asymmetrical blocks. The meeting concluded with a summary of the next steps in the Section 106 process, the anticipated schedule of the EA release, and planning for another meeting to discuss in greater detail the design of the asymmetrical blocks (particularly the 2-foot shift in the “carpet”).

5.3.1.9 Consulting Parties Meeting No. 9, October 18, 2018

The meeting opened with an overview of recent activities and a summary of a consulting party proposal for a design-based mitigation option that would rebuild the wide side of the asymmetrical blocks with the existing pattern, tree, and light locations (described in **Section 2.5**). The project team described why the proposal would not meet the purpose and need for the Project and the consulting parties provided their comments regarding the project team’s rationale. The project team proposed, in concept, to reconstruct the half-block between Cleveland Place and Broadway in its existing configuration, including the fountain, as part of the LPA. The remainder of the proposal was carried forward for evaluation in the EA as a design option to the LPA. The group discussed detailed drawings of the vertical curb, pan, and hybrid curb options, including common elements included in each option. The consulting parties provided comments related to the design of the concepts. The meeting closed with a review of mitigation that has been proposed, to date, including a new measure that was proposed as a part of the meeting.

5.3.1.10 Consulting Parties Meeting No. 10, December 6, 2018

The meeting began with an overview of recent activities, and information regarding the selection of the hybrid curb option for inclusion in the LPA. The meeting focused on the first draft of the Section 106 Memorandum of Agreement (MOA). SHPO requested the agreement document be a Programmatic Agreement, rather than a MOA, because ongoing consultation would need to occur after the agreement is signed. The Programmatic Agreement will be incorporated into the design-build procurement and will be a contractual obligation; the consulting parties want to ensure there is time for meaningful input during the design-build process. The group discussed specific edits to the draft agreement document, which the project team agreed to incorporate and distribute to consulting parties for a second round of review and comment. The group agreed to hold one or two working sessions to discuss how a potential historic façade enhancement program could operate.

5.4 Remaining Public and Agency Input for Environmental Assessment Process

This EA will be distributed for a 30-day review and comment period.

The EA is available for review electronically on The Mall Experience website: https://www.denvergov.org/themallexperience

The EA is available for review in hard copy at the following locations:

- Federal Transit Administration, 1961 Stout Street, Suite #13-301, Denver, CO 80294
- RTD FasTracks Office, 1560 Broadway, Suite 700 – Front Desk, Denver, CO 80202
- RTD Main Office, 1660 Blake Street – Front Desk, Denver, CO 80202
- City and County of Denver Public Works Department, Wellington Webb Municipal Office Building, 201 West Colfax Avenue, 10th Floor – Finance Administrative Office, Denver, CO 80202
- Denver Public Library, Central Library, 10 West 14th Avenue, Western & Genealogy – Fifth Floor, Denver, CO 80204

Comments on the EA are encouraged. Please submit comments electronically on the project website, or by mail or e-mail to: Susan Wood, RTD, 1560 Broadway, Suite 700, Denver, CO, 80202, (Susan.Wood@RTD-Denver.com). Public meetings will be held to present the results of the EA and solicit comments; information regarding the date, location, and time of these meetings will be provided on The Mall Experience website listed previously.

The *16th Street Mall Draft Section 4(f) Evaluation* (FTA, 2019) is concurrently available for electronic and hard copy review at the same locations where the EA is available.

SECTION 6

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