Appendix A
16th Street Mall Cultural Resources Technical Report

ERRATA SHEET March 2019

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

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

References

Federal Transit Administration (FTA). 2018. *16th Street Mall Alternatives Analysis and Environmental Clearance: Cultural Resources Technical Report.* June.

FTA. 2019. *16th Street Mall Draft Section 4(f) Evaluation*. March.

FTA. 2019. *16th Street Mall Alternatives Analysis and Environmental Assessment.* April.

F I N A L

Alternatives Analysis and Environmental Clearance: Cultural Resources Technical Report

Prepared by

Denver Regional Transportation District
City and County of Denver
Downtown Denver Partnership

June 2018
Amended March 2019 with Errata Sheet

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Acronyms and Abbreviations

ACHP	Advisory Council on Historic Preservation
APE	area of potential effects
CCD	City and County of Denver
CFR	*Code of Federal Regulations*
DDP	Downtown Denver Partnership
EA	environmental assessment
GIS	geographic information system
FTA	Federal Transit Administration
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NRHP	National Register of Historic Places
OAHP	Office of Archaeology and Historic Preservation
RTD	Regional Transportation District
SHPO	State Historic Preservation Officer
USC	United States Code
UMTA	Urban Mass Transportation Administration

SECTION 1

Introduction

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

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

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

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

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

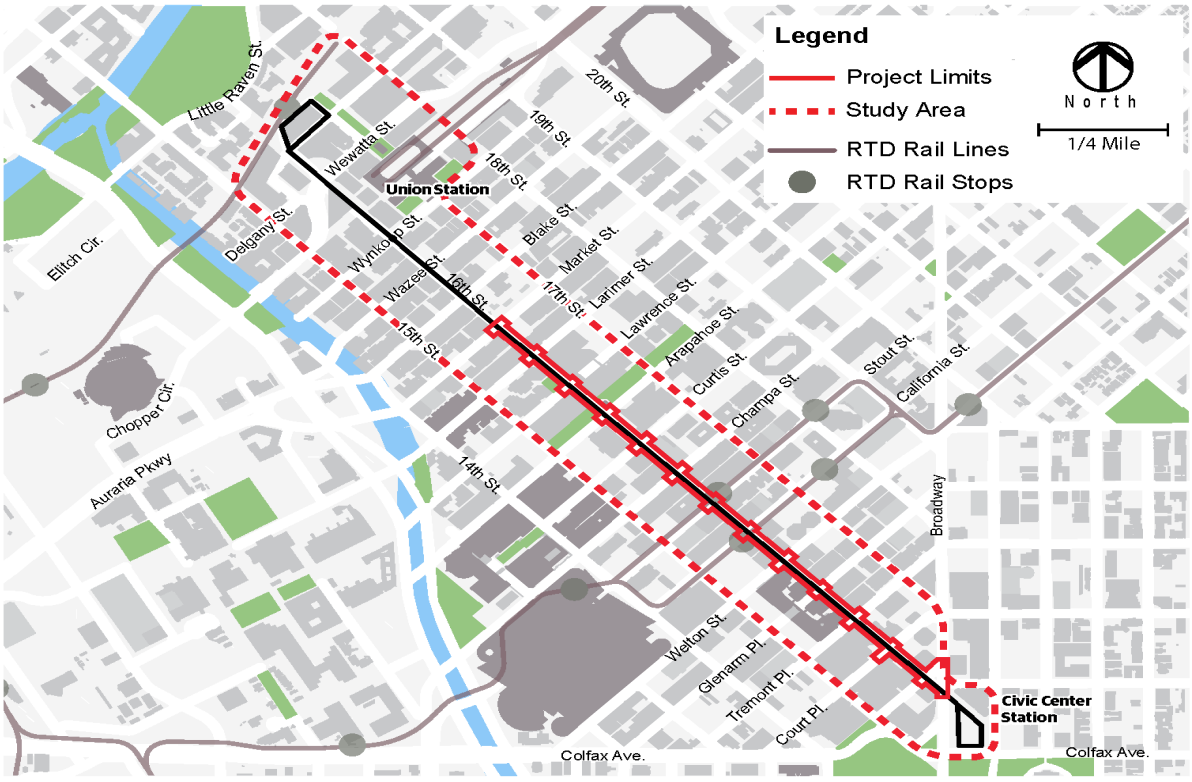
1.1 Project Description

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

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

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

Figure 1-1. Project Limits and Study Area



1.2 Project Purpose and Need

1.2.1 Purpose of the Undertaking

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

1.2.2 Need for the Undertaking

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

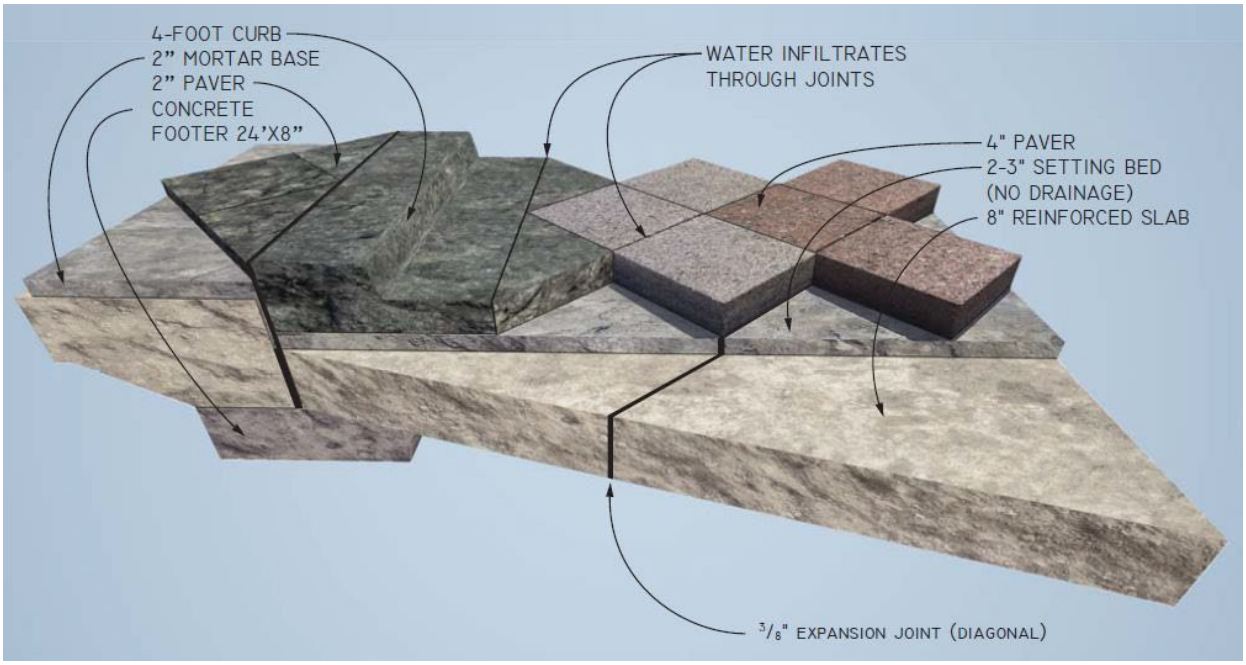
- Address deteriorating infrastructure to allow reasonable maintenance frequency and costs to businesses and taxpayers.
- Improve safety for pedestrians and vehicles.
- Maintain mobility for desired transit operations and for all users.
- Increase opportunities for public use of the Mall as an iconic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

1.2.2.1 Infrastructure

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

The transit way was constructed with 4-inch-thick granite pavers that were installed in a mortar setting bed over a series of concrete slabs supported by footers. The Mall's pedestrian area consists of 2-inch granite pavers in a mortar setting bed, which overlays a series of concrete slabs. **Figure 1-2** illustrates the design of the Mall's pavement system.

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 can be trapped there for an extended period of time. The mortar setting bed stays saturated with water for much of the year and is subjected to numerous freeze-thaw cycles. Each time water within the pavement system freezes, it expands and erodes the saturated material, causing severe deterioration over time. The deteriorated mortar setting beds do not provide the necessary support for the pavers, and pavers become dislodged and sometimes damaged, requiring replacement (Atkinson, 2015).

1.2.2.2 Safety

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

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

The current configuration of the Mall, particularly in the median blocks, creates a condition where space is constrained for pedestrians during peak hours. Pedestrians may walk into the transit lanes or immediately adjacent to transit lanes, where they could be hit by shuttle bus mirrors or cause buses to stop sharply; this creates safety concerns for bus riders as well as

pedestrians. A review of existing pedestrian crash and RTD claims data reveals that five times more pedestrian/bus crashes occur in the existing median blocks than in the asymmetrical blocks (reference the *16th Street Mall – Pedestrian, Bicycle, and Transit Vehicle Crash Analysis* technical memorandum included in **Appendix B** of the EA). Conflicts between pedestrians and shuttles need to be reduced through a design of the Mall that incorporates current best practices for pedestrian and transit way safety.

1.2.2.3 Mobility

In the 1970s, downtown Denver was experiencing high rates of bus congestion, especially on 16th and 17th streets, which limited convenient access to those streets. In addition, the design of pedestrian areas was secondary, which discouraged pedestrian activity. The Mall was a joint solution put forth by the downtown Denver business community and RTD to reinvent 16th Street as a pedestrian destination and relieve bus congestion in downtown Denver (RTD, 1978). The Mall was designed to operate with a free transit shuttle bus service (called the Free MallRide) and transfer stations at each end (BID et al., 2010).

Sidewalks and transit ways provide and accommodate mobility on the Mall. The Free MallRide shuttle ridership is 39,000 riders each weekday, which is anticipated to increase to approximately 70,000 passengers per day by 2035 (RTD, 2017a and 2017b). The current capacity of the two 8-foot pedestrian walking areas on the median blocks is approximately 3,840 pedestrians per hour, while the current capacity of the 8- and 14-foot pedestrian walking areas on the asymmetrical blocks is approximately 5,280 pedestrians per hour (Gehl, 2016). The 8-foot pedestrian walking areas do not meet City and County of Denver (CCD) standards for downtown sidewalk width of 10 feet (CCD, 1993). During peak hours, the capacity is further reduced, as people gathering at Free MallRide bus stops obstruct the pedestrian walkways on the median blocks and narrow sides of the asymmetrical blocks.

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

1.2.2.4 Public Use

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

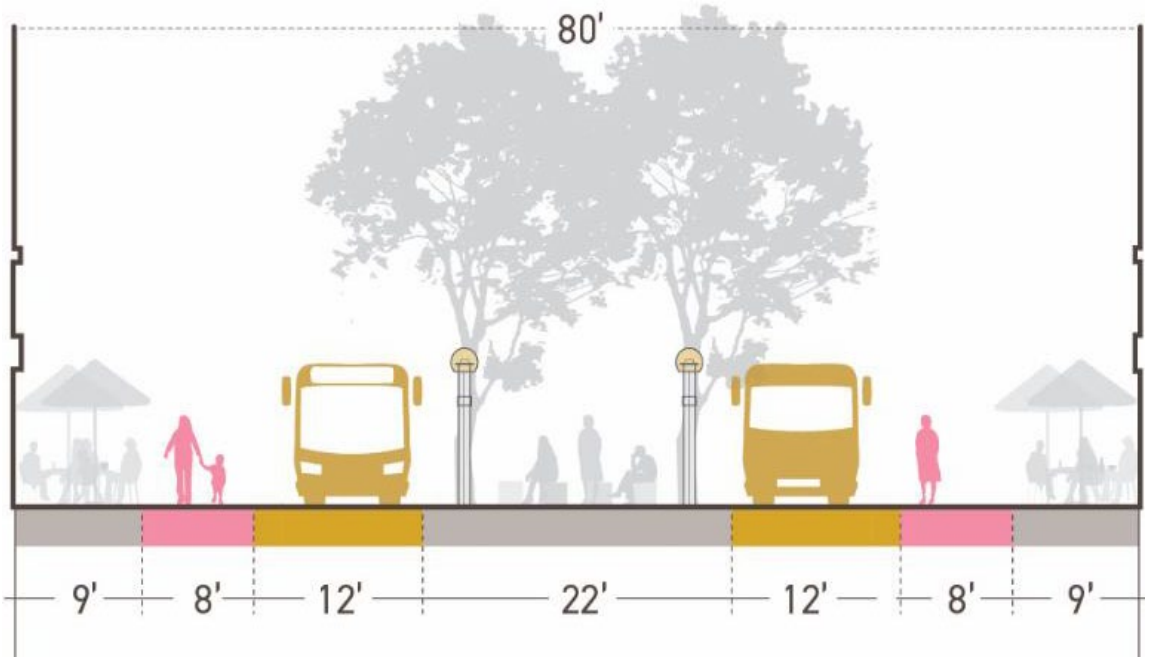
RTD completed an EA in 1978 and selected the Transitway/Mall Alternative based on the following criteria: (1) Provide more efficient bus service to city and suburban neighborhoods, (2) Lessen traffic congestion in downtown, and (3) Create a new pedestrian environment in the downtown, a place for people (RTD, 1978). The Mall opened in 1982. Today, the Mall is a diverse retail destination with a variety of retailers, hybrid retail and entertainment venues, drugstores, tourist-oriented shops, and a variety of restaurants all accessible via the Free MallRide. The Mall has become the spine of downtown Denver.

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

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

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

Figure 1-3. Cross Section of Existing Median Blocks



The median is set apart from other pedestrian areas physically and by transit service, which isolates the space, restricts natural surveillance, and results in low ownership of the space by adjacent businesses and users; as a result, the space lacks consistent activation. The median space, while slightly larger than the sidewalks to the sides of the Mall, is too small to provide adequate and comfortable gathering space for pedestrian in between the transit lanes. The

space is underused, as people prefer to gather along the edges, and inherently back away from fast-moving objects like the buses (Gehl, 2016).

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

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

1.2.3 Project Goals

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

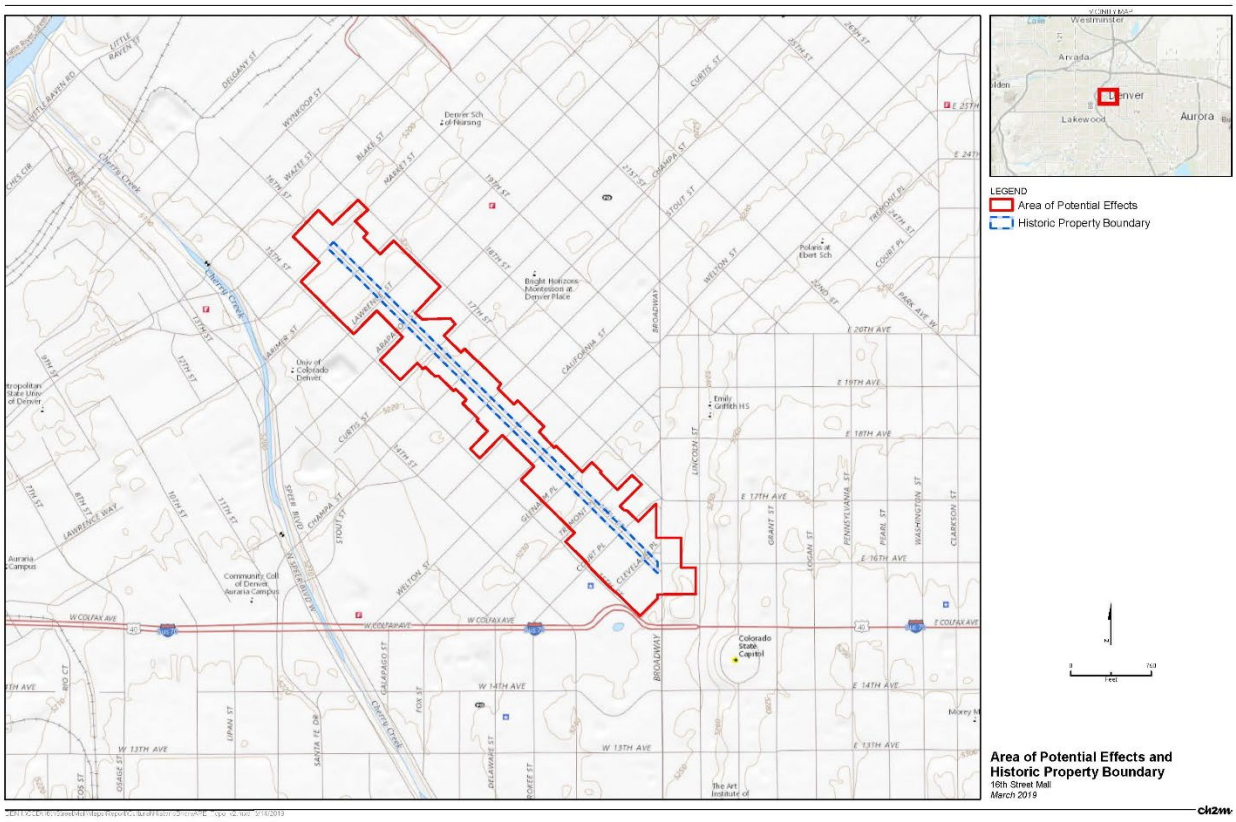
- Maintain and improve transit operations to provide convenient and efficient travel in downtown Denver, including the Free MallRide and Free MetroRide.
- Maintain and improve economic viability of businesses on the Mall and on adjacent streets.
- Provide a balance of amenities fronting properties on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

1.2.4 Area of Potential Effects

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

The APE includes 32 properties listed on or eligible for listing on the National Register of Historic Places (NRHP), including the Mall itself. **Section 5.0** discusses these properties in detail.

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



SECTION 2

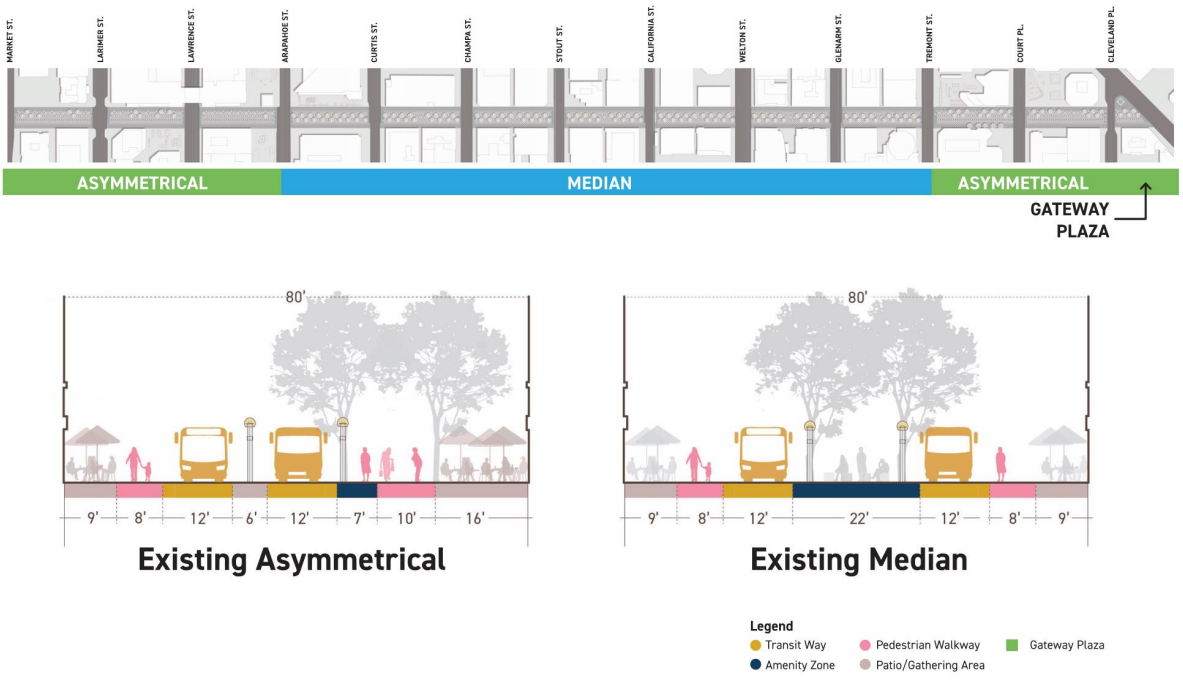
Project Alternatives

2.1 No Build Alternative

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

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

Figure 2-1. Existing Cross-section



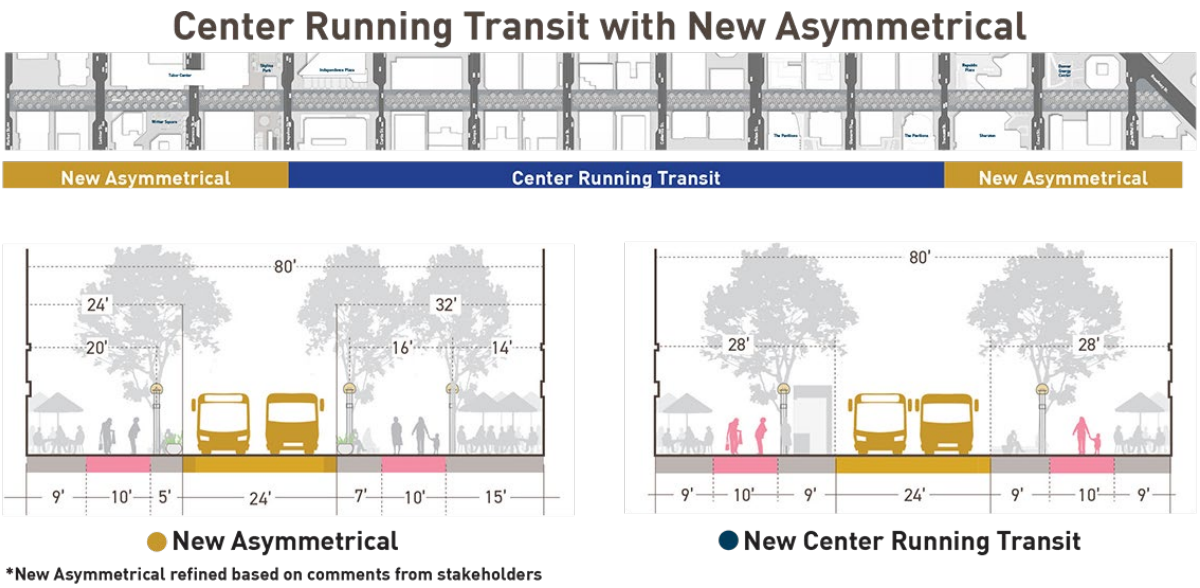
The No Build Alternative includes the current transportation system with the committed transportation improvements in the Denver Regional Council of Governments (DRCOG) *2018-2021 Regional Transportation Improvement Program* and *2040 Fiscally Constrained Regional Transportation Plan*.

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

2.2 Locally Preferred Alternative

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

Figure 2-2. Locally Preferred Alternative Cross Section



2.2.1 Capital Improvements

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

2.2.1.1 Alignments and Transitions

From Market Street to Arapahoe Street and from Tremont Street to Broadway, the alignment would be the new asymmetrical cross-section design (**Figure 2-2**). The new asymmetrical cross-section design removes the existing small strip with light fixtures from between the transit way lanes, pushes the existing two 12-foot transit way sections together into a single transit way comprising two adjacent 12-foot transit lanes, increases the size of the sidewalk on the narrow side of the cross section from 17 feet to 24 feet, and reduces the sidewalk on the wide side of the cross section from 33 feet to 32 feet. Each sidewalk would consist of

patio/gathering space, tree/amenity zone, and a minimum 10-foot-wide pedestrian walking area free of encroachments from elements such as furnishings, kiosks, and bus stops.

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

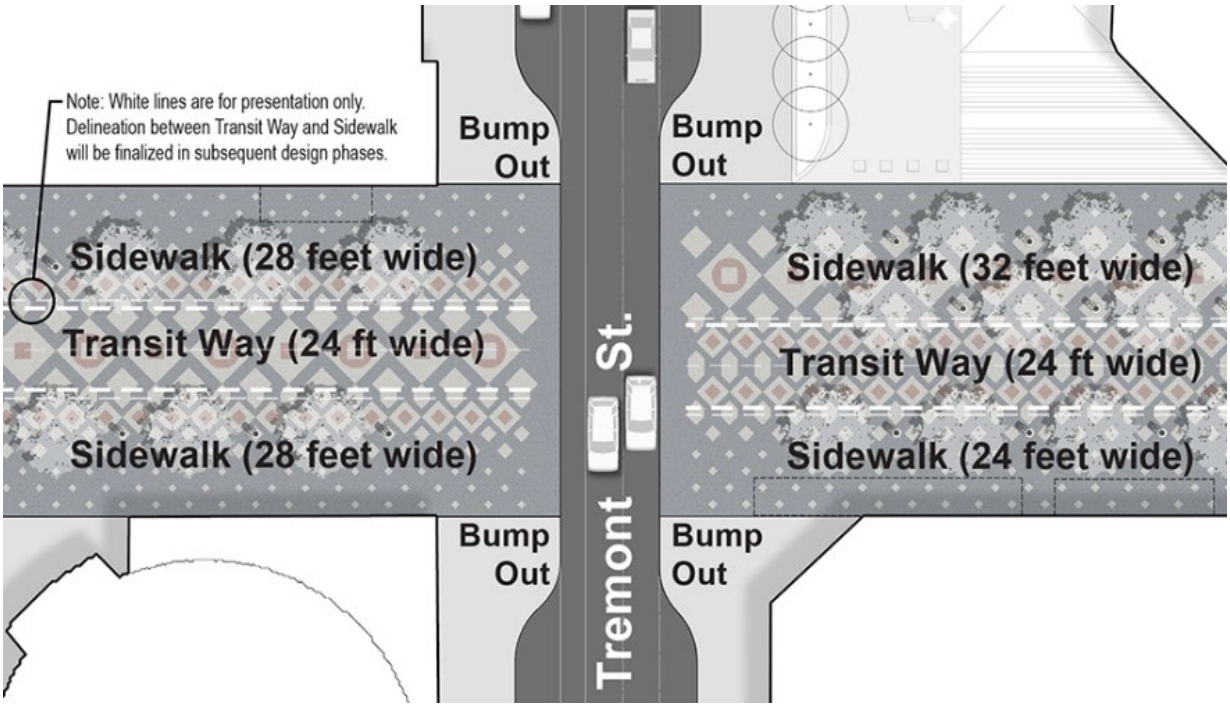
The LPA could be implemented with curbs, as it exists currently, or with a design option that implements the center-running and new asymmetrical cross-section designs without curbs. Constructing the LPA with curbs replicates the existing condition and is preferred for transit operations. Constructing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

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

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

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

Figure 2-3. 16th Street Mall Transit Lane Transition at Tremont Street



2.2.1.2 Pavement Materials and Pattern

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

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

2.2.1.3 Trees and Tree Infrastructure

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

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

2.2.1.4 Utilities and Technologies of the Future

The LPA will upsize electrical conduits and wiring belowground to allow for expanded capacity and will remove and replace landscape irrigation and drainage infrastructure. The LPA will also provide the opportunity to install fiber optic and/or other underground telecommunications

utilities to meet current and future demands. Wi-fi or other next-generation communication systems may be installed aboveground, to allow for future technologies, but not as a part of this undertaking.

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

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

2.2.1.5 Safety and Security

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

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

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

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

2.2.1.6 Lighting, Signage, and Furnishings

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

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

2.2.1.7 Changes to Cross Streets

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

controls, such as crosswalks and crossing signals, would be decided during subsequent design phases.

2.2.1.8 Funding and Intergovernmental Agreements

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

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

2.2.2 Transit Operations

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

2.2.3 Traffic Operations

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

2.2.4 Construction Activities

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

2.2.4.1 Timeline, Phasing, and Access

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

Construction of the LPA is anticipated to take 2.5 to 4 years. Major construction activities on each block would last approximately 8 to 12 months; however, minor construction activities or

unforeseen utility-related construction activities may last longer. Construction would generally occur in two- to six- block segments and each segment would require multiple construction phases.

2.2.4.2 Staging

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

2.2.4.3 Construction Activities

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

Access to the construction site will be controlled through appropriate standards set forth by the Colorado Department of Public Health and Environment, CCD Occupational Safety and Health Administration, the ADA, the Manual on Uniform Traffic Control Devices (FHWA, 2009), and the National Fire Protection Association Standard 130 for Fixed Guideway Transit and Passenger Rail Systems, and by other applicable regulatory requirements. Haul routes to and from the construction site or staging sites will be determined during subsequent design phases. Existing haul routes will be used to the extent practicable.

SECTION 3

Regulatory Context

The term “cultural resources” encompasses properties of the built environment, archeological sites and artifacts, and Native American sites, artifacts, and cultural properties. Native American cultural resources may include human skeletal remains, funerary items, sacred items, and objects of cultural patrimony. Native American traditional resource procurement areas and culturally important regional landscapes are also considered Native American cultural resources and may be traditional cultural properties if they are places that define tribal identity and meet NRHP eligibility criteria.

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

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

3.1 Federal Regulations

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

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

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

The regulations implementing Section 106 are codified at 36 CFR 800. The Section 106 review process involves four steps, as follows:

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

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

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

3.2 Section 106 Consultation

The Section 106 consultation process for this undertaking was initiated in June 2017. The FTA and RTD had six consulting party meetings between June 2017 and February 2018 (inclusive) to discuss the definition of the Project APE; historic properties identified within the APE; the alternatives analysis; the design, materials, and trees; OAHP Form 1403, which describes the Mall's NRHP-eligibility, character-defining features and significance (**Attachment 2**); and the effects to the identified historic properties from the LPA. The consultation process is ongoing.

SHPO has not had an opportunity to concur with FTA's finding of effects, but the effects have been discussed with the consulting parties at the consulting party meetings. Upcoming

meetings will discuss appropriate mitigation measures to address the adverse effect on the Mall historic property. Resolution of the adverse effect will be stipulated in an Memorandum of Agreement (MOA) to be developed among the consulting parties and the federal agency. The MOA will be executed prior to completion of the NEPA agreement document.

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

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

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

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

SECTION 4

Methodology

4.1 Records Search

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

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

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

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

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

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

4.2 National Register of Historic Places Eligibility

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

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 were.

For transportation projects that could impact cultural resources, Section 4(f) of the Department of Transportation Act of 1966 also protects historic resources. Section 4(f) applies to all projects that require approval by an agency of the U.S. Department of Transportation. 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 is provided in **Section 5** of the EA.

4.3 Effects Analysis Methods

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

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

- **No Historic Properties Affected:** Either no historic properties are present, or there is no effect of any kind, neither harmful nor beneficial, on the historic properties.
- **No Adverse Effect:** There is an effect, but the effect is not harmful to those characteristics that qualify the property for inclusion in the NRHP.
- **Adverse Effect:** There is an effect, and that effect diminishes the qualities of significance that qualify the property for inclusion in the NRHP.

An adverse effect is found when an undertaking may alter any characteristic of a historic property that qualifies the property for inclusion in the NRHP in a manner that would diminish the integrity of the property. This includes diminishing the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time or be further removed in distance, or effects that may be cumulative.

Examples of adverse effects to historic properties outlined in 36 CFR 800.5 include, but are not limited to, the following:

1. Physical destruction of, or damage to, all or part of the property;
2. Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous materials remediation, and provision of handicapped access, that is not consistent with the Secretary of Interior's standards for the treatment of historic properties (36 CFR 68) and applicable guidelines;
3. Removal of the property from its historic location;
4. Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;
5. Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features;
6. Neglect of a property which causes deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to a [Native American] or native Hawaiian organization; and
7. Transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

Identified Historic Properties

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

5.1 Historical Context

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

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

Figure 5-1. 1977 Conditions on 16th Street

Source: RTD, 1977-1979

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

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

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

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

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

As summarized in *The Transitway/Mall: A Transportation Project in the Central Business District of Metropolitan Denver*, the goals of the project were to "lessen traffic congestion" in downtown Denver, "provide more efficient bus service" to Denver's downtown and suburban neighborhoods, and to "create a new pedestrian environment in the downtown – a place for people" (I.M. Pei & Partners, 1977).

The design concept took into consideration the existing scale of the street, with its variety of visual elements, buildings sizes and uses, and unique interest of the street. The challenge for the designers was to "create a unifying theme and common identity for the street, while protecting its distinctive personality" (I.M. Pei & Partners, 1977). The designers believed that landscaping, in particular, trees, would create the desired unifying theme as well as provide physical protection from the elements: "The location of trees is crucial" (I.M. Pei & Partners, 1977). Thus, the design placed them in the center, diagonally spaced, 32 feet apart so as not to block accessibility or visibility of the structures lining the mall and to maintain the visibility and unique visual qualities of the exiting street. The sidewalks were widened and considered quasi-private spaces that were essentially adjuncts to the shops lining the street. The transit lanes were physically depressed from the sidewalks, but visually cohesive with the pavement pattern. The designers wanted to define the vehicular lanes for safety reasons, but also to make this definition in the least visually obtrusive way.

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

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

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

Following general plans and public input throughout the 1970s (Sixteenth Street Mall Corporation, 1973–1974; RTD, 1977–1979), construction began in early 1981 (**Figure 5-2**) based on the approved 1980 design from the architects/landscape architects team (Historic Denver, Inc., 2012a). Funding of $76 million came from UMTA and RTD, operator of the Mall buses (Marritz, 2014). The project began on the northwestern end at Market Street and proceeded southeast in increments along the entire 80-foot-wide 16th Street right-of-way. The design cross section specified a transit way concrete base sloping to each curb from an apex centered between the transit lanes (I.M. Pei & Partners, 1980).

Figure 5-2. Overview of Block Design Used on 16th Street Mall, 1981

Source: Photograph courtesy of the Denver Post (2012).

Subsequent maintenance and replacement of the granite pavers indicated the concrete base was ultimately not built with slopes, or with inadequate slopes and disposition of surface water that permeates into the base through deteriorated paver joints (Harvey, 2015).

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

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

Figure 5-3. The 16th Street Mall, 1987, Facing Southeast

Source: Photograph courtesy of the Denver Post (2012).

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

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

5.2 Historic Properties

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

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

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
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

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

ID No.	Historic Property Name	Address	NRHP Eligibility
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
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 archaeological site	Broadway	NRHP-eligible

5.2.1 16th Street Mall

5.2.1.1 Property Description

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

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

Figure 5-4. 16th Street Mall

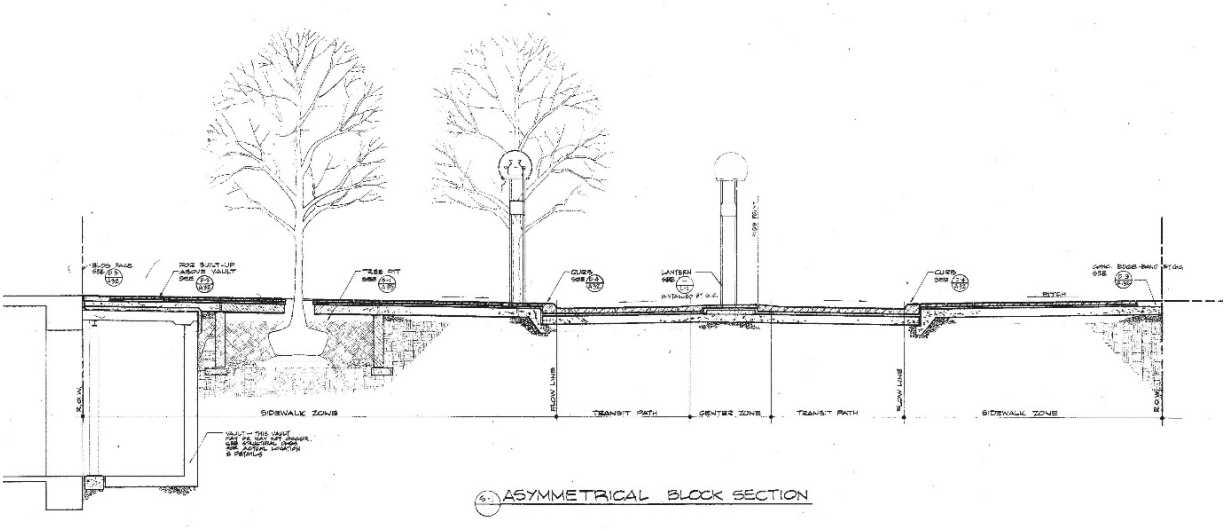
Source: CH2M (Photographed by Sara Orton) February 28, 2018

According to the 1977 design concept (I.M. Pei & Partners, 1977):

> …[the] "basic elements of the 16th Street urban design concept include:
>
> - A double row of mature Honey Locust trees flanking a 22-foot wide promenade in the center of the street.
> - Two 10-foot-wide transitway paths on either side of the central zone.
> - Widened sidewalks along the storefronts.
> - Patterned paving over the entire street surface in varying tones of muted grays and red.
> - A combination light fixture creating a variety of lighting levels at dusk, during the evening, and for late-night security.
> - Shelters, benches, fountains as well as places for displays, sidewalk cafes, and special events.
>
> This basic arrangement is modified on the end blocks of the mall. Here, the transitway paths come together and are flanked by a single row of trees offset to open the street to views of the mountains and the D & F Tower at one end, and the Capitol dome at the other."

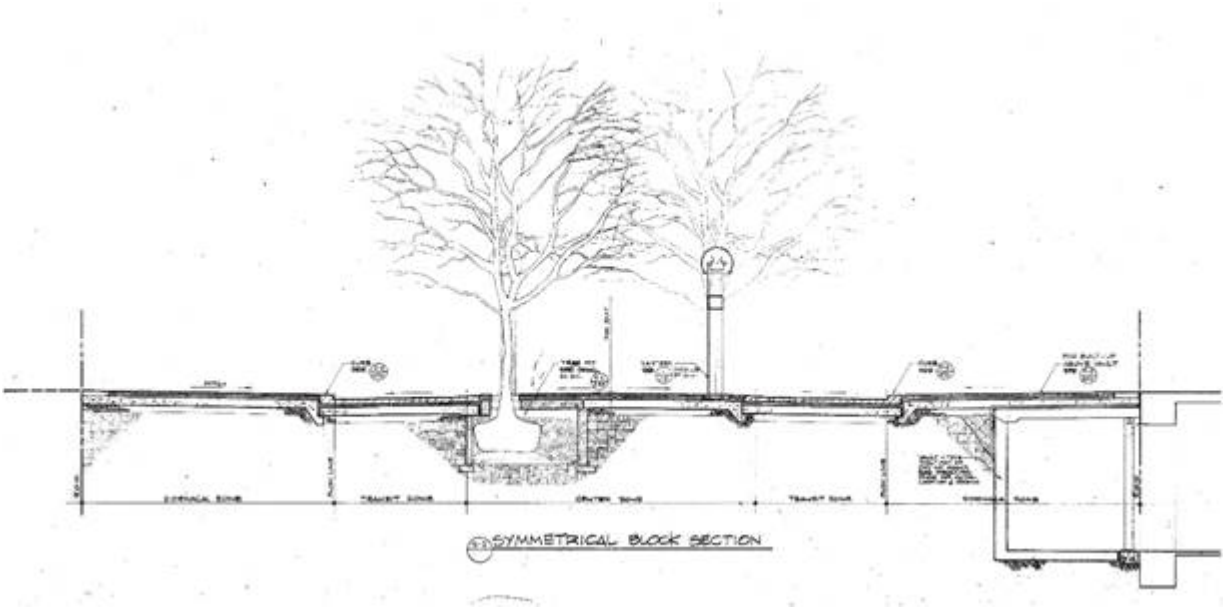
The design, precisely interwoven granite pavers in three colors and unified by the tree plantings and light standards, took into consideration the existing scale of the street. Specifically, designed signage, planters, street furniture (e.g., benches and shelters), fountains, banners and other moveable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

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



Source: I. M. Pei & Partners, 1980

5-6. Cross Section, Original Symmetrical Median Blocks



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

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

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

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

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

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

Figure 5-8. Honey Locust Trees in Median Blocks

Source: CH2M (Photographed by Sara Orton) June 30, 2017

Figure 5-9. Honey Locust Trees and Replica Light Standards

Source: CH2M (Photographed by Sara Orton) January 12, 2018

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

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

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

Figure 5-10. Original 16th Street Mall Light Standard

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

Figure 5-11. Replica Light Standards

Source: CH2M (Photographed by Sara Orton) February 28, 2018

Figure 5-12. Original Street Sign at 16th Street Mall and Market Street

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

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

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

5.2.1.2 Statement of Significance

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

The 16th Street Mall meets NRHP eligibility Criterion Consideration G, as a property that is identifiable as historically significant at less than 50 years old. The property is eligible for listing in the NRHP under Criterion A at a local level and Criterion C at the state and local level of significance. It's period of significance is 1980 through 1982, the period of its final design and construction. In meeting the Criterion Consideration G, the original design and construction

elements from 1982 transformed Denver's downtown streetscape, when the transit way and mall opened, and best represent the exceptional conceptualization of its architects.

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

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

When considering this historic context, the Mall has not definitively achieved significance at a national or state level under Criterion A. Its local significance and contributions are evident, but more historical perspective and time is needed to fully understand if it has state or national significance for a resource using Criteria Consideration G. Per NPS guidance, additional scholarly evaluation and historical perspective over time will help the public understand the role properties from the recent past have played at a national level (NPS 2002; NPS 1998). Other properties determined significant under Criterion A at the national level less than 50 years after they were constructed, tend to have broader implications on the history of the United States, associated with major national themes like the United Farm Workers' movements and Apollo 11 launch. Few pedestrian and/or transit malls developed in the post-World War II context are listed on the NRHP. The notable example is the Lincoln Road Mall, a pedestrian mall constructed in Miami, Florida, ca. 1950 and itself needing revitalization by the late 1960s/early 1970s (Harden 2013), was listed on the NRHP in 2011 (NPS 2011). The Fulton Mall is eligible but not listed on the NRHP. The Nicollet Mall was redeveloped from 2015 to 2017. Although pedestrian and transit malls continue to be developed and redeveloped across the nation, few from that initial era of post-World War II downtown redevelopment remain. A national study found that, by the mid-1980s, "85% of the original 200 U.S. pedestrian malls had been

reopened to traffic" (Judge 2013:3; Harden 2013). South Burdick Street in Kalamazoo, Michigan—credited as being the first pedestrian mall established for downtown redevelopment, in 1959—reopened for vehicle traffic in 1998 (Harden 2013). Comparatively, the *Denver Business Journal* notes that, for Denver, "closing more than a mile of a downtown street to cars has been an unusual—and much-studied—success" (Harden 2013). As presented by the *Denver Business Journal*, many of the less enduring pedestrian malls were not as well planned and designed as the 16th Street example (OAHP, 2018).

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

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

Colorado was where I. M. Pei and his associates, including Henry Cobb, first conducted and completed a project as a fully independent design firm, after splitting from the firm of Webb and Knapp in 1960—where they had begun their careers (Wiseman 2007). They garnered national recognition with development of the National Center for Atmospheric Research building in Boulder 1961 and 1967. In that Colorado design, Pei incorporated Southwestern elements reflective of Mesa Verde cliff dwellings and natural elements intended to incorporate and display aspects of nature while remaining monumental in a Modern style (Wiseman 2007). Distinctive influences from nature and Native Americans of Colorado and the Southwest would again be reflected in the design of the 16th Street Mall. The natural and cultural accents

employed by the Pei team's architects and landscape architects were in contrast to the starker concrete construction of most Modern design at the time, which has led this unadorned, function-driven construction style to sometimes be called "brutalism" (OAHP, 2018).

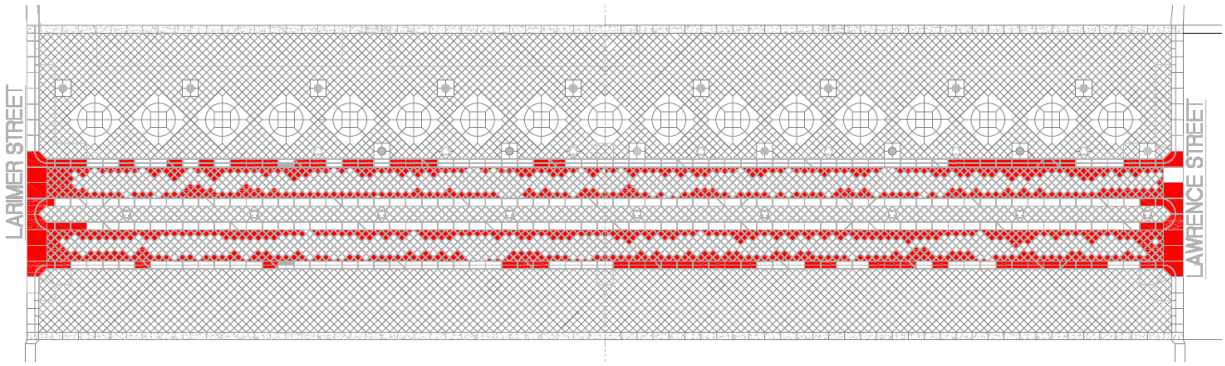
While the 16th Street Mall further demonstrates Post-Modern influences, it's design and concept reflect the earlier Modern examples completed in Philadelphia, Minnesota, and Fresno through federal and local agency involvement. As a Post-Modern structure, the 16th Street Mall incorporates elements of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

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

5.2.1.3 Integrity

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

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



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

Some integrity of materials and feeling has been lost through subsequent removal of most of the custom-designed telephone stands and the inactivity of fountains. Some trees have been lost to disease or age, but this has had little overall impact to the setting, feeling, and

association of the Mall. The original turn-around at Civic Center was removed, but the Mall retains integrity of design and workmanship on the remaining 12.5 blocks, even with the loss of that portion of the original design.

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

5.2.1.4 Skyline Park

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

Figure 5-14. Map of Skyline Park

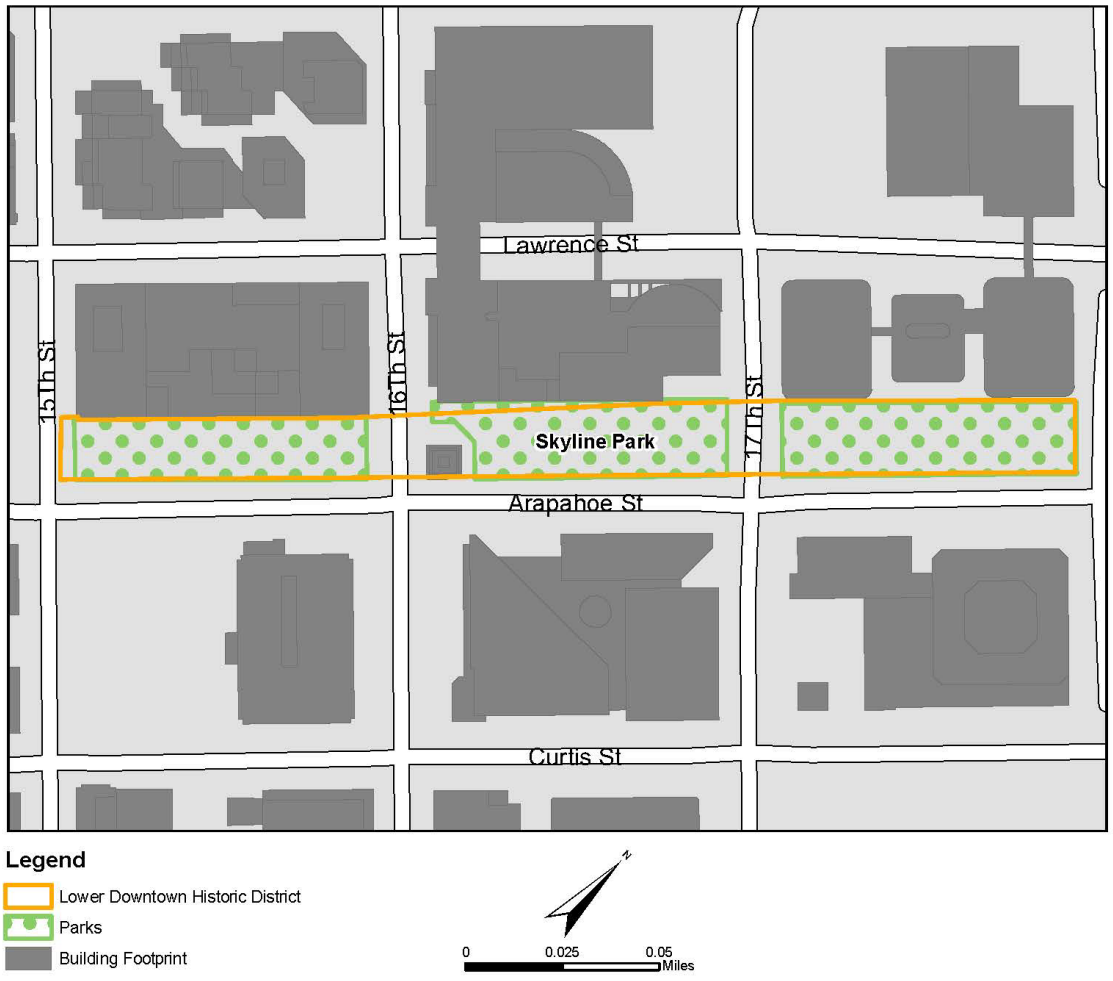


Figure 5-15. Skyline Park, facing 17th Street

Source: CH2M (Photographed by Sara Orton) March 1, 2018

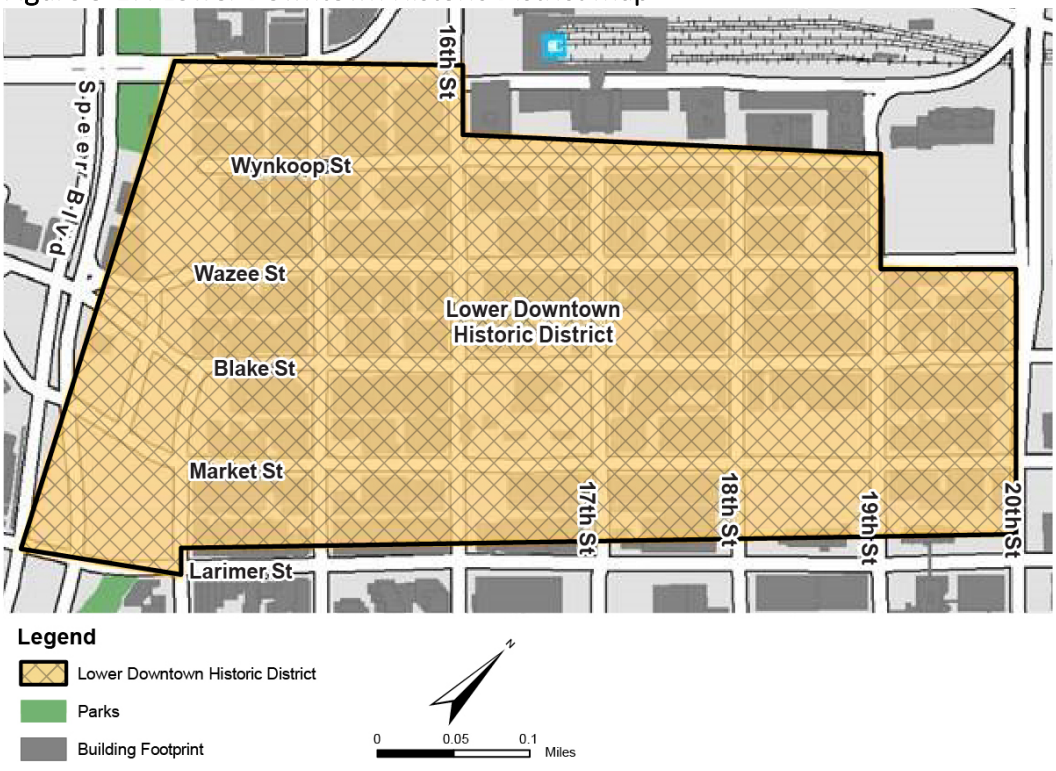
5.2.2 Historic Districts

5.2.2.1 Lower Downtown Historic District

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

Figure 5-16. Market Center in the 1600 Block of Market Street in the Lower Downtown Historic District

Figure 5-17. Lower Downtown Historic District Map



5.2.2.2 16th Street Historic District

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

5.2.2.3 Downtown Denver Historic District

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

5.2.3 Archaeological Resources

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

SECTION 6

Findings of Effect

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

6.1 No Build Alternative

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

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

6.2 Locally Preferred Alternative

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

6.2.1 16th Street Mall Historic Property

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

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

6.2.1.1 Character-defining Features

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

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

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

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

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

Measures have been taken throughout the design development and consultation process to retain the I.M. Pei–Hanna/OLIN design concepts and philosophies in the proposed paver pattern (**Attachment 7**) contains the Project team's Pattern and Geometry Studies). However, the undertaking would alter the paver pattern, the programming of the paver patterns, and the exact locations of the current pavers, and the pavers themselves.

Planting. The trees selected by the original design team—honey locust for the median blocks and red oaks for the end blocks—were part of the intentional monoculture design. City regulations and best practices regarding tree species have changed since the 1980s to discourage monoculture plantings, to keep the tree canopy healthy and full and to avoid single species die-offs (as happened with the red oaks).

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

Table 6-1. Historic and Current Tree Criteria Comparison

Original 1977 Criteria[a]	2018 Criteria
Design Elements	
Height and Diameter: 35 feet tall	Height and Diameter: 35 feet tall • Ability to create straight trunk with first branching at 20-foot height • Crown spread: 20 to 25 feet for promenade trees, 30 to 35 feet minimum for shade trees
Branch and leaf structure: Lacy and Open	Branch and leaf structure: Lacy and Open
Shade characteristics: Dappled Shade	Shade characteristics: Dappled Shade
	Leaf color: • Yellow fall color for shade trees • Contrast for promenade trees
	Leaf texture
Tree Health Elements	
Sun exposure: thrives in partial shade	Sun exposure: thrives in partial shade
Water requirements: moderate	Water requirements: moderate to Xeric
Drought resistant	Drought resistant
Tolerant to wind and air pollution	Tolerant to wind and air pollution
Disease and insect resistance	Disease and insect resistance
	Salt tolerant
	Tolerant of high pH soils
	Growth Rate: fast to moderate preferred

Original 1977 Criteria[a]	2018 Criteria
Other Elements	
Availability	Availability

[a] Source: I.M Pei & Partners, 1977

The design team and the CCD City Forester's office will work closely to meet both the design criteria and the intent of the design criteria, when selecting the tree species (**Attachment 8**). But it will not be possible to have one species along the center-running blocks and one along the new asymmetrical blocks. This alters the original design by disrupting the intentional selection of just two species.

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

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

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

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

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

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

Other Features. Other character-defining features would also be affected by the undertaking. Although final decisions have not been made, it is likely that most of the original street

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

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

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

6.2.1.2 Visual Effects

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

6.2.1.3 Construction Effects

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

6.2.1.4 Design Options for Transitway Delineation

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

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

The design option to have no curb between the transit way and pedestrian space may not result in noticeable visual change to the Mall's pavement pattern. One of the character-defining features of the Mall is the special units of charcoal and light gray granite pavers for the curbs and curb cuts, so removal of that feature would impact the original design of the historic property. However, charcoal and light gray pavers could be used in the No Curb design option, but they would not vertically separate the transit way from the pedestrian area.

Mitigation Measures

Mitigation measures to address impacts to either design option would not be different; would mitigate the removal or moving of curbs with similar measures; and would mitigate the loss of engineering features in the same way. Measures to mitigate the pattern changes will be the same for each of the design options.

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

6.2.1.5 Summary

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

6.2.1.6 Skyline Park

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

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

6.2.2 Historic Districts

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

6.2.2.1 Lower Downtown Historic District

The Mall is outside the period of significance of the Lower Downtown Historic District and is not a contributing element of the district. Only a half block of the 16th Street Mall historic property is within the boundaries of the historic district. The alley between Larimer and Market streets is the boundary of the district, so the half block between the alley and Market Street would be

the only area affected by the Project and is a very small portion of the larger district. The district as a whole would remain intact and retain the key character-defining features that convey its significance. Project elements would be within existing transportation right-of-way and would not require any property acquisitions within the district.

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

16th Street Historic District

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

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

6.2.3 Historic Properties adjacent to the Mall

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

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

6.2.3.1 Visual Effects

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

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

6.2.3.2 Noise and Vibration Effects

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

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

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

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

6.2.3.3 Construction Effects

Construction impacts identified in the EA would apply to the businesses and residences along the Mall. The setting and feeling of the structures would be temporarily affected during construction of the LPA. Transit service would be shifted or moved off the Mall as described in **Section 4** of the EA, pedestrian activity would be reduced, trees would be removed, and the street would be excavated to repair and replace the infrastructure. These effects would no longer exist following completion of the construction.

The current location, setting, feeling and association of these buildings would not be altered by the LPA, as it will continue to be a transit and pedestrian corridor with two lanes of public transit, parallel rows of trees and pole lighting, and pedestrian walkways directly adjacent to the structures. The conversion of the median to transit lanes would not affect the historic significance of the structures. The basic form, massing, use, and general appearance of the Mall would remain unchanged; therefore, there would be no visual or atmospheric changes to the historic properties. Because there would be no direct impacts, the design, materials, and workmanship of the historic structures would not be affected by the LPA.

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

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

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

6.2.4 Archaeological Resources

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

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

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

6.2.5 Cumulative Effects

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

6.3 Summary

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

Table 6-2. Findings of Effect on Historic Properties within the Area of Potential Effects
16th Street Mall Alternatives Analysis and Environmental Clearance Project, Denver, Denver County

Historic Property Name	Address	NRHP Eligibility	Finding of Effect
Waters Building – Market Center	1642 - 1644 Market Street	District Contributor	No Adverse Effect[a]
Hitchings Block	1620 Market Street	District Contributor	No Adverse Effect[a]
Liebhardt-Linder Building – Market Center	1624 Market Street	District Contributor	No Adverse Effect[a]
McCrary Block – Market Center	1628 Market Street	District Contributor	No Adverse Effect[a]
Steel Building; Fontius Building; Sage Building	1555 Welton; 600 16th Street	District Contributor	No Adverse Effect[a]
Liebhardt Building; Cottrell Clothing Company	601 16th Street	District Contributor	No Adverse Effect[a]
Daniels & Fisher Tower	1101 16th Street; 1601 Arapahoe Street	Listed on NRHP	No Adverse Effect[a]
Denver Dry Goods Company Building	702 16th Street; California Street; and 16th Street	Listed on NRHP	No Adverse Effect[a]
Masonic Temple Building	1614 Welton Street, 535 16th Street	Listed on NRHP	No Adverse Effect[a]
Kittredge Building	511 16th Street	Listed on NRHP	No Adverse Effect[a]

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

Historic Property Name	Address	NRHP Eligibility	Finding of Effect
Skyline Park	1500-1800 Arapahoe Street	NRHP-eligible	No Adverse Effect[a]
16th Street Historic District	Multiple	NRHP-eligible	No Adverse Effect
Denver Tramway Trolley Lines archaeological 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 visual or atmospheric changes to the historic properties; properties would retain integrity of design, materials, workmanship, location, setting, feeling and association.

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

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

SECTION 7

Avoidance, Minimization, and Mitigation

7.1 Avoidance

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

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

7.1.1 No Build Alternative

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

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

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

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

7.1.2 Rebuild in Existing Configuration Alternative

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

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

FTA has determined that the Rebuild in Existing Configuration Alternative could be built as a matter of sound engineering judgment and would be feasible from an engineering perspective. The alternative would address the need to improve deteriorating infrastructure and reduce maintenance frequency and costs to businesses and taxpayers. However, it would not meet the following Project needs:

- *Improve safety for pedestrians and vehicles.* The Rebuild in Existing Condition Alternative would reconstruct the Mall in the same physical configuration as its current design, which would not address safety problems related to the physical design of the Mall. The Rebuild in Existing Configuration Alternative would result in continued safety issues related to the need for better delineation between pedestrian walkways and transit lanes.
- The Rebuild in Existing Configuration Alternative would continue to lack consistent visual delineation between pedestrian walking areas and transit lanes, and the attached sidewalk configuration does not conform with national guidance specific to pedestrian safety. This design would perpetuate the existing condition where pedestrians intentionally (because of sidewalk crowding) or accidentally (because of the lack of clear delineation) walk into the transit lanes or close enough to the transit lanes to be hit by bus mirrors.
- *Maintain mobility for desired transit operations and for all users.* The Rebuild in Existing Configuration Alternative would continue the use of undersized sidewalks. The 8-foot pedestrian walking areas do not meet CCD design standards for 10-foot unobstructed sidewalk width downtown (CCD, 1993) and do not accommodate pedestrian volumes, which currently reach up to 4,100 pedestrians per hour at the east end of the Mall between Champa Street and Glenarm Place. At bus stops, the carrying capacity of the 8-foot walking areas is reduced because people gathering at bus stops obstruct the pedestrian walkway as a result of its location immediately adjacent to the transit lanes.
- *Increase opportunities for public use of the Mall as an iconic civic space for leisure, commerce, and tourism*. The Rebuild in Existing Configuration Alternative would continue to have narrow and divided public spaces on the Mall, perpetuating the limited usability of the Mall for safe and engaging public use and amenities. The physical design of the medians would remain too small for comfortable public gathering. The outer sidewalks on the median blocks, and on the narrow sides of the asymmetrical blocks, would remain too small to allow for both a standard 10-foot pedestrian walking area and a 9-foot patio and amenity space.

7.1.3 Partial Repair Alternative

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

- Renovate existing granite paver system in some areas, but not replace the existing concrete sub-base slab. This alternative would be implemented by reusing the existing granite pavers. In the transit lanes, the process would include cataloging the existing pattern, removing the existing pavers, cleaning and refinishing the pavers, and then resetting the pavers in their original location. In the pedestrian areas, the pavers would not be removed, but they would be refinished

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

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

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

7.1.4 Reduce Transit Service on Mall Alternative

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

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

The Reduce Transit Service on Mall Alternative would not address the following Project needs:

- *Address deteriorating infrastructure to allow reasonable maintenance frequency and costs to businesses and taxpayers*. This alternative would not fully address the failing and deteriorating infrastructure on the Mall and would not fix the flawed pavement system that does not drain water, resulting in the need to reconstruct or replace the infrastructure at a future point in time. Existing and ongoing maintenance problems would continue.
- *Improve safety for pedestrians and vehicles*. Fewer buses would travel in the transit way, reducing the potential for pedestrian/transit conflicts from existing conditions. However, this alternative would result in the continued safety issue associated with poor delineation between undersized pedestrian walks immediately adjacent to transit lanes.

- *Maintain mobility for desired transit operations and for all users.* The Reduce Transit Service on Mall Alternative would decrease mobility by reducing transit service on the Mall. Parallel routes do not have the capacity to accommodate the transit demand and do not provide equivalent travel times because of longer routes, buses operating in mixed traffic, and out-of-direction travel for riders to reach bus service on parallel streets. Pedestrian walking areas would remain undersized.
- *Increase opportunities for public use of mall.* The reduced transit service would reduce somewhat the barrier effect of transit service on the medians, but the medians would remain too narrow to provide both adequate and comfortable gathering spaces and pedestrian circulation around the gathering space in between the transit lanes.

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

7.2 Minimization

7.2.1 Measures to Minimize Effects on Archeological Resources

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

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

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

- Retain a granite paver surface in the same three colors as the original design.
- Maintain overall design concept of a carpet covering the Mall surface, by retaining a full 80-foot-wide patterned carpet from building face to building face.
- Retain the 45-degree diagonal grid pattern.
- Retain the existing locations of shifts in transit lane alignment in keeping with the beginning, middle, and end in the original design.
- Maintain spatial relationship between trees and light standards.
- Retain permeability of pedestrians throughout each block.
- Minor changes to the overall pattern of the granite pavers from existing design.

- Retain a single row of aligned trees for 12.5 blocks.
- Replicated historic light fixtures would continue to be used in current and new locations.
- Retain street signs on traffic signals.

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

7.3 Mitigation

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

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

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

Table 7-1. Summary of Effects on Historic Properties and Mitigation

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

SECTION 8

Conclusion

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

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

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

SECTION 9

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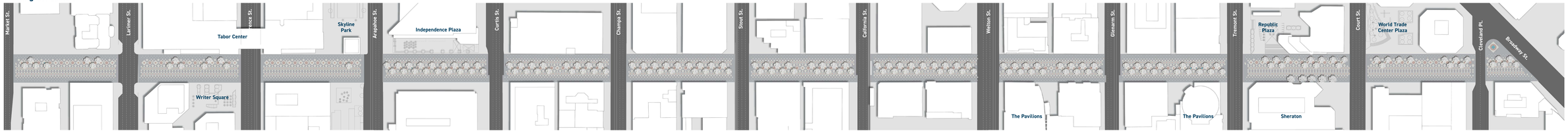
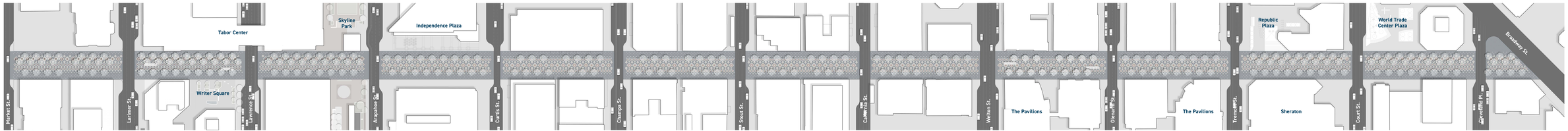
Attachment 1
Locally Preferred Alternative
Preliminary Design

The 16th Street Mall

Existing Conditions



Proposed Alternative: Center Running & New Asymmetrical



Attachment 2
16th Street Mall Form 1403

OAHP1403
Rev. 9/98

COLORADO CULTURAL RESOURCE SURVEY

Architectural Inventory Form

Official eligibility determination
(OAHP use only)
Date _____ Initials _____
____ Determined Eligible- NR
____ Determined Not Eligible- NR
____ Determined Eligible- SR
____ Determined Not Eligible- SR
____ Need Data
____ Contributes to eligible NR District
____ Noncontributing to eligible NR District

I. IDENTIFICATION

1. Resource number: 5DV7044
2. Temporary resource number: _____
3. County: Denver
4. City: Denver
5. Historic building name: 16th Street Transitway / Mall (Structure - Designed Landscape)
6. Current building name: 16th Street Mall (Structure - Designed Landscape)
7. Building address: Broadway northwest to Market Street, 80202
8. Owner name and address: City/County of Denver: Department of Public Works,
   201 West Colfax Avenue, Denver, Colorado 80202

II. GEOGRAPHIC INFORMATION

9. P.M. 6th Township 3S Range 68W
   ____ ¼ of NE ¼ of SE ¼ of NE ¼ of Section 33
   ____ ¼ of SW ¼ of SW ¼ of NW ¼ of Section 34
   ____ ¼ of NE ¼ of NW ¼ of SW ¼ of Section 34
   ____ ¼ of SW ¼ of NE ¼ of SW ¼ of Section 34
   ____ ¼ of NE ¼ of SE ¼ of SW ¼ of Section 34
10. UTM reference **(center point of structure)**
    Zone 13; 505422 mE 4399594 mN
11. USGS quad name: Englewood, CO Year: 1980 Map scale: 7.5 feet X 15.0 feet
12. Lot(s): _____ Block: _____
    Addition: _____ Year of Addition: _____
13. Boundary Description and Justification:
    Description: Full width of 16th Street (from the adjacent building faces lining the northeast side to building faces lining the southwest side, typically 80 feet wide) from Broadway at its west line of intersection with 16th Street, northwest 12 blocks to Market Street at its southeast line of intersection with 16th Street (approximately 4,675 ft or 0.9 miles), plus the small triangular block bounded by Broadway, 16th Street, and Cleveland Place.
    Justification: This boundary encompasses the original design limits of the 1980 transitway and mall design by I.M. Pei & Partners, and Hanna/Olin landscape architects, from which mall construction proceeded.

III. Architectural Description (Structural Description)

14. Building plan (footprint, shape): Rectangular (Denver Street Right-of-Way, including sidewalks)
15. Dimensions in feet: Length 4,675 feet x Width 80 feet
16. Number of stories: N/A
17. Primary external wall material(s): Granite paver units in two shades of gray, and one shade of red.
18. Roof configuration: N/A
19. Primary external roof material: N/A
20. Special features: Paver pattern, ornamentation
21. General architectural description: Designed landscape/streetscape and transit mall. This property is a 12-block, 80-foot-wide transitway and pedestrian corridor with three distinct zones, a central zone with a 22-foot-wide median with 2 parallel rows of trees, and end blocks where the transit lanes are adjacent with a single row of parallel trees. The essential elements of the design, according to the 1977 design concept document, are "paving, planting, and lighting" (Pei, 1977) (described in greater detail in Section 35). Key elements were finalized in 1980 design drawings, prior to mall construction in 1981. The intricate patterning of the pavers and the paving material were used by the designers to establish the character of the mall. The geometry of the pattern, based on the city's existing street system and corresponding to 16th Street's 45-degree angle where it meets Broadway, is a 45-degree diagonal grid, which was intended to encourage diagonal pedestrian movement along the mall. The pattern "begins along the street wall as a field of gray paving block which gradually builds in scale as it reaches the center of the mall. The pattern at the edges is deliberately neutral to avoid competition with the varied dimensions of the storefronts and doorways. In the center zone, the pattern becomes more colorful and dominant" (Pei, 1977). The pavement design is carried along the length of the mall by polychrome granite units, generally 1-foot 5-inch by 1-foot 5-inch square granite pavers—charcoal gray, light gray, and "Colorado red" (Cultural Landscape Foundation [CLF] 2009)—with special curb, ramp, drain, circular, and other units from the same granite color palette. The streetscape also features custom-designed and custom-built light fixtures, signage, telephone stands, planter and trash receptacles, drinking fountains, and pavement fountains. Consistent tree plantings of 220 oaks and honey locusts are rooted in special underground structural-concrete chambers, 5 feet 5 inches deep, supported by a "suspended pavement system," with custom tree gratings at the pavement plane (Marritz 2014).

    Architectural style/building type: Modern Movement (See Section 42)
22. Landscaping or special setting features: See Sections 17, 21, 42
23. Associated buildings, features, or objects: The flanking block faces of buildings, and their evolution throughout the function of the transitway and mall after 1980, were accommodated with the landscape/streetscape design, but are not part of the structure. The project incorporated and re-designed the triangular block hosting "United Nations Square" at Cleveland Place and Broadway.

IV. ARCHITECTURAL HISTORY

25. Date of Construction: Estimate:_____ Actual: 1982 (original); 1992 (extension from Blake Street to Union Station, later modified northeast of Wynkoop Street, not part of this evaluation)
Source of information: 1980 Design Drawings, I.M. Pei & Partners, Architects and Planners

26. Architect: I.M. Pei and Henry Cobb, Architects with I.M. Pei & Partners (Pei Cobb Freed and Partners), New York; Laurie Olin of Hanna/Olin (now OLIN), Landscape Consultants, Philadelphia; Phillip E. Flores Associates, Landscape Architects, Denver
Source of information: 1980 Design Drawings, I.M. Pei & Partners, Architects and Planners

27. Builder/Contractor: J.A. Walker Company, Denver
Source of information: 1980 Design Drawings, I.M. Pei & Partners, Architects and Planners

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

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

Oral histories of workers and designers (Historic Denver, Inc. 2012b) described how pedestrian passage, business access, and as much vehicular traffic as possible continued during construction. The contractor encountered and re-located, or moved deeper, several uncharted steam pipes and water mains as construction progressed. Tree placement in specially designed, irrigated, and drained concrete root chambers under the mall surfaces presented challenges, especially when completed and paved to match the continuous pavement of the transit lanes and sidewalks (Historic Denver, Inc. 2012b). Construction concluded with a public dedication attended by 200,000 on October 4, 1982. Design and construction issues, which resulted in separation of the granite pavers from the joint mortar causing the pavers to sink into the setting bed space, were noted subsequent to opening. A civil suit was filed (RTD, et al v. Weaver, et al, Civil Action No. 83-CV-8819) as a result of paver failure on the transitway. The settlement agreement was filed on September 29, 1986 that released the litigants from future liability and awarded RTD a total amount of $4.07 million to be dispersed over a period of 25 years.

RTD separately contracted designs and construction for its Civic Center Transfer Facility (later named Civic Center Station) as the southeastern mall-bus terminal, and the Northwest Transfer Facility (later named Market Street Station) as the northwestern terminal including mall-bus drop off and turnaround in the block between Market and Blake Streets. In 1992, following removal of the 16th Street viaduct across the Union Station railyard, RTD and FTA extended the 16th Street Transitway and Mall from Blake Street to the north side of Union Station and the new Light-Rail terminal there. After 2010, that Transitway and Mall and Light-Rail terminal underwent further reconfiguration to their current services north of the intersection of 16th Street and Chestnut Place in the former Union Station railyard. RTD performs continual maintenance, including with FTA assistance, on the Transitway, such as replacing broken granite pavers and special units. The City/County of Denver has subsequently rebuilt most cross-streets; however, the scored concrete intersection surfaces between block lengths were never built as planned per the original 1980 Pei/Olin 16th Street Transitway and Mall design. Constructed based on the original designs was a bus turn-around at the Civic Center Station, which has since been removed. Originally, the transitway vehicles crossed Broadway and had a turnaround area in the Civic Center between the Concourse Level (lower level) and the Plaza Level (upper level which lead to the nearby government offices.

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

V. HISTORICAL ASSOCIATIONS

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

As summarized in the 1977 *The Transitway Mall* design concept document, the goals of the project were to "lessen traffic congestion" in downtown Denver, "provide more efficient bus service" to Denver's downtown and suburban neighborhoods, and to "create a new pedestrian environment in the downtown

– a place for people" (Pei & Partners 1977). The basic, over-arching design elements on which the design was based were: "a double row of Honey Locust trees flanking a 22-foot wide promenade in the center of the street; two 10-foot wide transitway paths on either side of the central zone; widened sidewalks along the storefronts; patterned paving over the entire street surface in varying tones of muted grays and red; a combination light fixtures creating a variety of lighting levels at dusk, during the evening, and for late-night security; and shelters, benches, fountains, as well as places for displays, sidewalk cafes, and special events" (Pei & Partners 1977). The end blocks are modified so the transitway lanes are together, "and are flanked by a single row of trees, originally red oak, offset to open the street to views of the mountains and the D & F Tower at one end, and the Capitol dome at the other" (Pei & Partners 1977).

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

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

Laurie Olin and Pei's principal designer, Henry Cobb, discussed a design approach of Southwestern geometric patterns early in their separate processes, then during their collaborative program, discussed including Navajo Chief-style blankets with polychrome diamond motifs. While still discussing the final design, Olin visited a souvenir shop along 16th Street Mall and encountered trouser belts decorated with diamondback rattlesnake skins. From those inspirations, the architects and landscape architects crafted the mall's overall design, precisely interwoven within three shades of granite pavers and unified by the tree plantings (see Section 21), and lighting standards. Signage, planters, street furniture (benches, shelters), fountains, banners and other moveable objects (mailboxes, phone boxes, trash receptacles) were part of the overall plan and were given a uniform design and placed along the street in a planned pattern to blend with the rest of the mall's design features.

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

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

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VI. SIGNIFICANCE

37. Local landmark designation: Yes ____ No _X_ Date of designation: _____

    Designating authority:

38. Applicable National Register **[of Historic Places, NRHP]** Criteria:

    _X_ A. Associated with events that have made a significant contribution to the broad pattern of our history;

    ____ B. Associated with the lives of persons significant in our past;

    _X_ C. Embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or that possess high artistic values, or represents a significant and distinguishable entity whose components may lack individual distinction; or

    ____ D. Has yielded, or may be likely to yield, information important in history or prehistory.

    _X_ G. Qualifies under Criteria Considerations A through G (see Manual)

    ____ Does not meet any of the above National Register criteria

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

40. Period of significance: 1980–1982

41. Level of significance: National ____ State _X_ Local _X_

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

    Criterion A: The 16th Street Mall is eligible for listing in the NRHP under Criterion A at a local level in the areas of Transportation and Community Planning and Development. The 16th Street Mall is significant for transforming Denver's downtown and revitalizing a fledging commercial district affected by post-World War II development outside of the city. As Denver-area residents relied more on the automobile, City streets became more congested and polluted, deterring downtown business growth and pedestrian use (Denver Partnership, Inc., et al. 1982). The 16th Street commercial area was in decline by the 1960s and 1970s, caused by population shifts to suburban settings, new trends in retail, and the preeminence of the automobile. Developers started to create large-scale shopping plazas on readily available land near new suburban tracts, reducing the importance and draw of a downtown commercial corridor. By the 1970s, at

least 15 different shopping centers existed in the Denver area outside of the downtown. The Public Mall Act was signed into Colorado law in 1970, "allowing municipalities to close off downtown streets" and "in reaction to businesses moving out of downtown areas to suburban indoor malls" (Aspen Historical Society 2015).

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

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

When considering the above historic context, the 16th Street Mall has not definitively achieved significance at a national or state level under Criterion A at this point in time. While its clear the significance and contributions made at the local level by the 16th Street Mall, more historical perspective and time is needed to fully understand if it has state or national significance for a resource using Criteria Consideration G.. Per NPS guidance, additional scholarly evaluation and historical perspective over time will help the public

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

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

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

properties fit within with the life work and contributions of masters to their field (NPS, 2002; NPS, 1998). Although each of the principal designers is still living, Pei, Cobb, and Olin have all had full careers within which to understand the importance of their projects, including the 16th Street Mall. Pei is about 101, Cobb 92, and Olin 80 years old (as of 2018), and Pei and Cobb have important projects that are now over 50 years old and considered historic on that basis. Denver's 16th Street Mall remains essential in representing their full body of work and is directly recognized as being among the noteworthy projects of these renowned designers (cf. CLF: https://tclf.org). The 16th Street Mall is historically important and exceptional within the history of Colorado at the state level for retaining examples of important works by these recognized masters, even though completed less than 50 years ago.

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

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

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

Character-Defining Features (Pei & Partners, 1980):

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

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

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

VII. NATIONAL REGISTER ELIGIBILITY ASSESSMENT (See also 42)

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

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

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

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

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

VIII. RECORDING INFORMATION

47. Photograph numbers: N/A

    Negatives filed at: SWCA Environmental Consultants (digital files)

48. Report title: 16th Street Mall National Register of Historic Places Eligibility Evaluation

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

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

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

52. Address: SWCA: 295 Interlocken Boulevard, Suite 300, Broomfield, Colorado 80021

    CH2M: 3330 W. Esplanade Avenue, Suite 612, Metairie, LA 70002

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

NOTE: Please include a sketch map, a photocopy of the USGS quad map indicating resource location, and photographs.

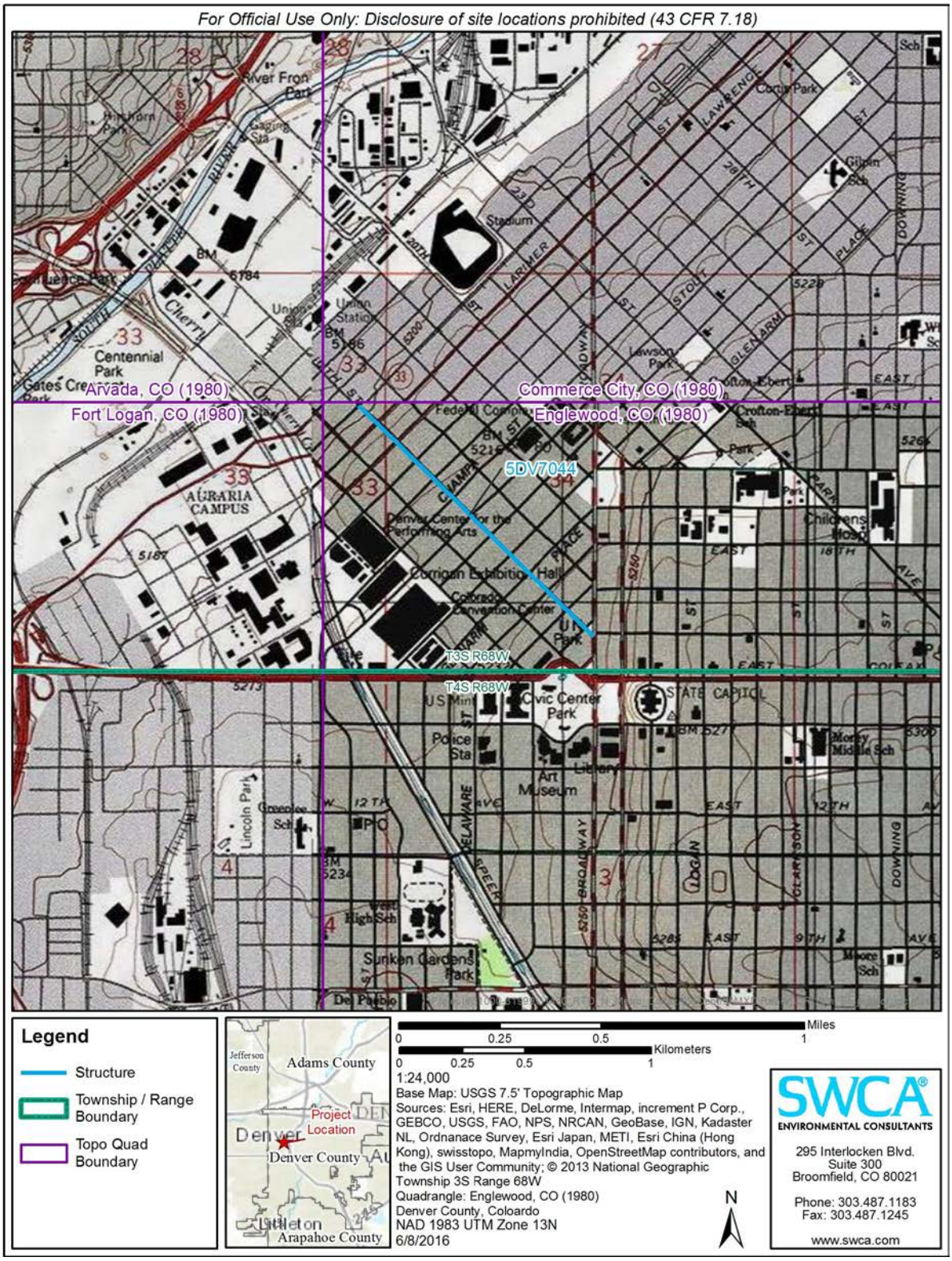


Figure 1. Location map.

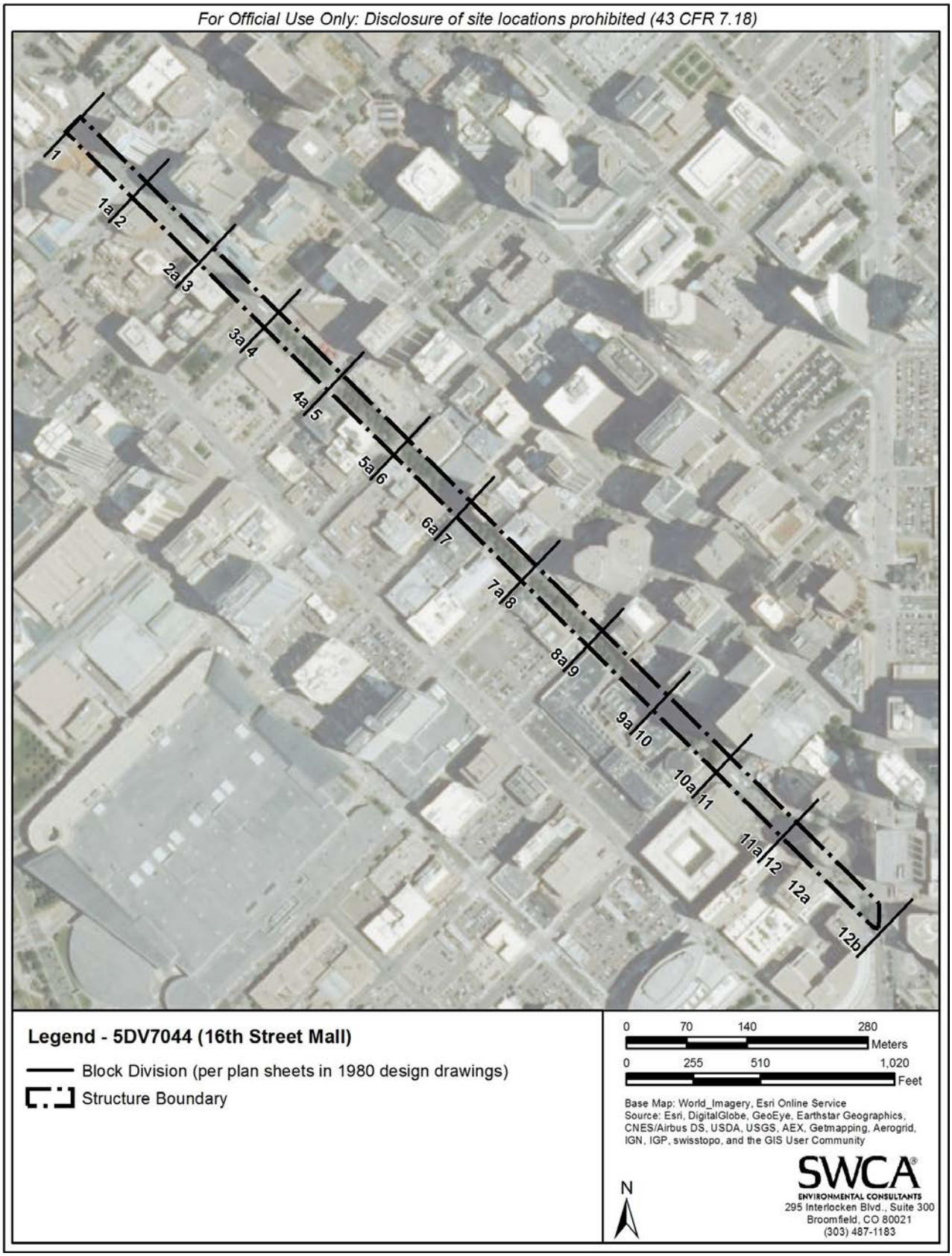


Figure 2. Sketch map, showing resource boundary of 1982–1992 16th Street Transitway | Mall.

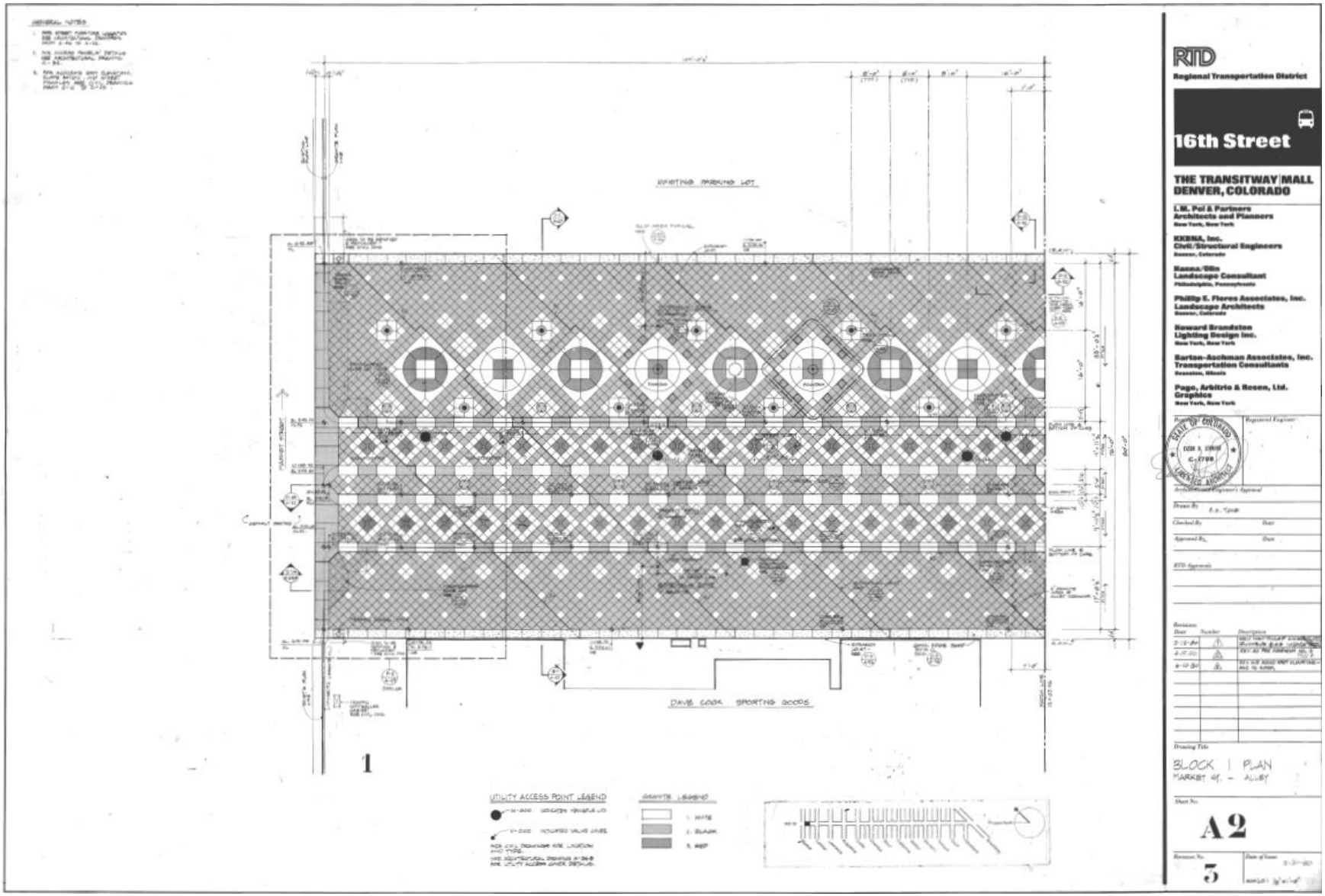


Figure 3. Original I.M. Pei / Hanna/Olin Block Plan as presented in 1980 drawings.

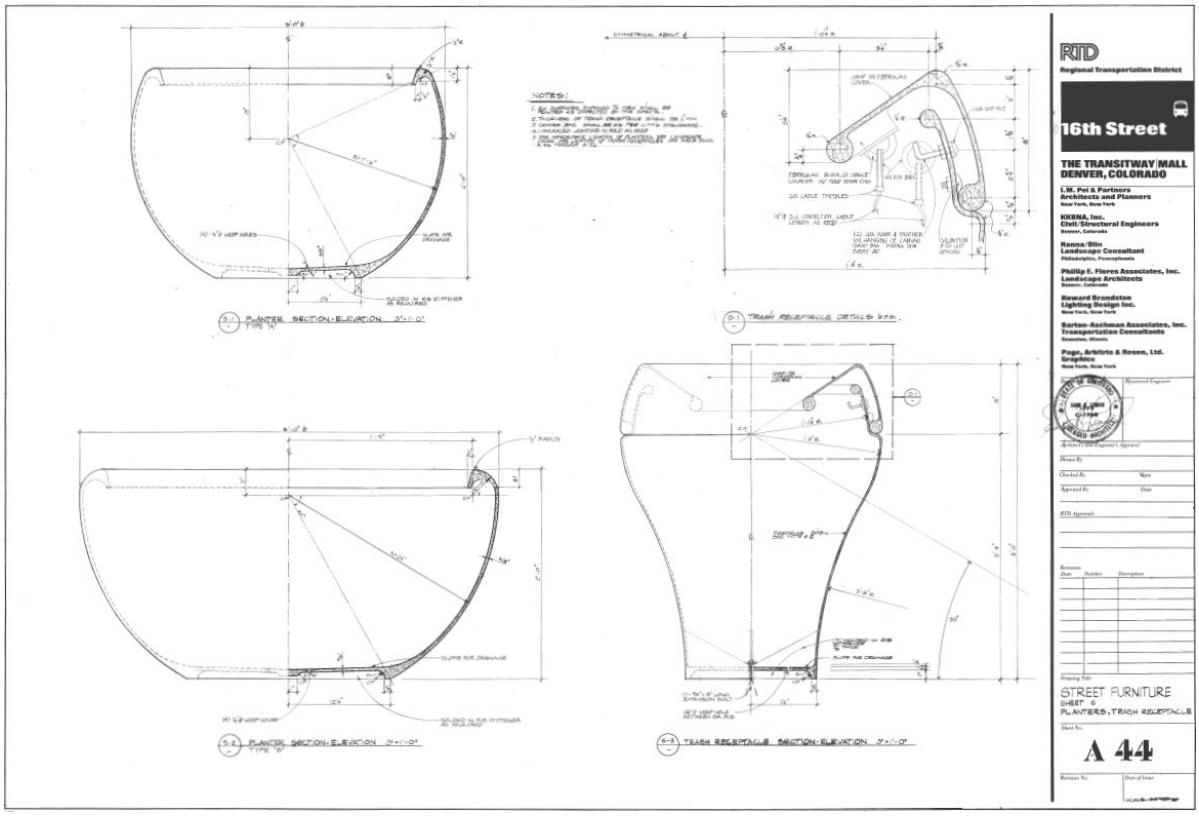


Figure 4. Original I.M. Pei / Hannan/Olin design for Planters and Trash Receptacles in 1980 drawings.

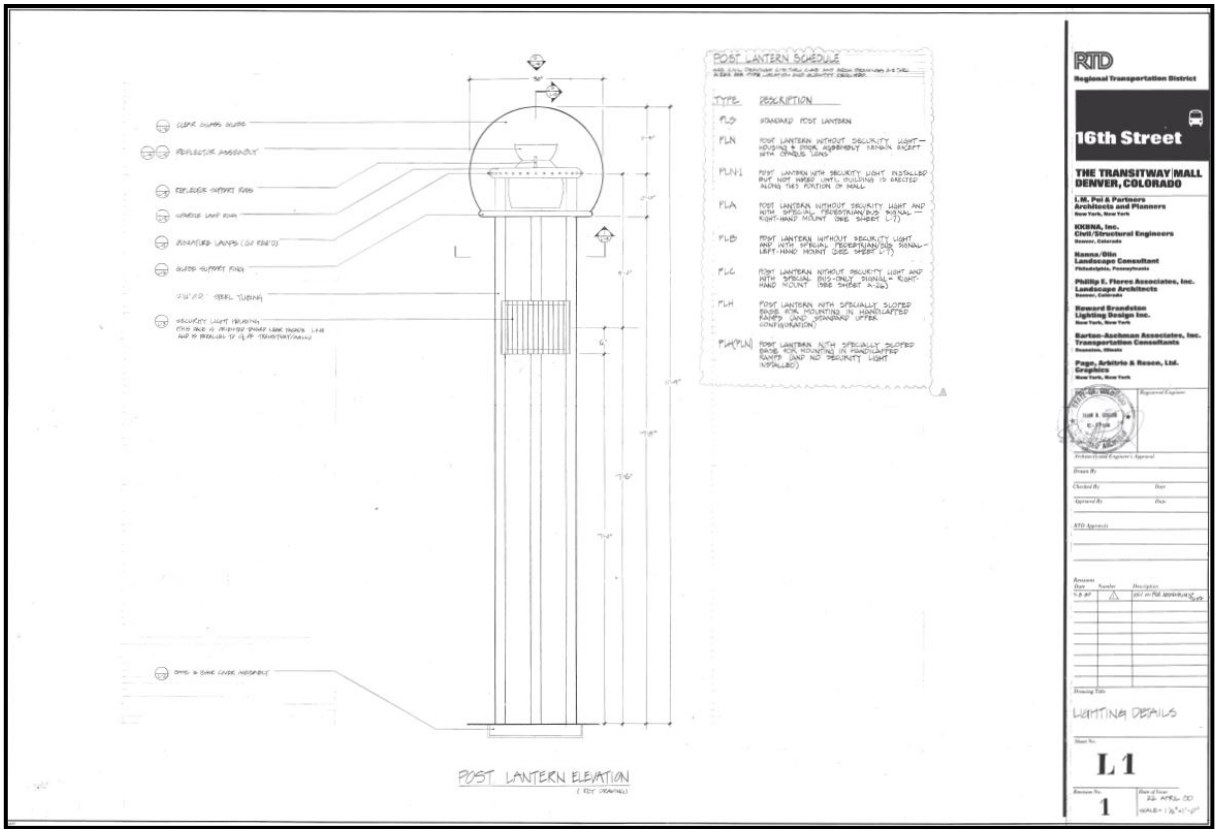


Figure 5. Original I.M. Pei / Hanna/Olin design for Post Lanterns in 1980 drawings.

- Overview of 16th Street Mall from Civic Center Station at Broadway.
- Facing northwest.
- Photographed by James Steely.
- Photo taken 06-06-2016.
- Image has not been altered.

- Overview of 16th Street Mall from Larimer Street.
- Facing southeast.
- Photograph courtesy of the Denver Post (2012).
- Photo taken in 1987.
- Image has not been altered.

- Overview of 16th Street Mall from Market Street.
- Facing southeast.
- Photographed by James Steely.
- Photo taken 06-06-2016.
- Image has not been altered.

- Close up of the original street sign at 16th Street Mall and Market Street.
- Facing west.
- Photographed by James Steely.
- Photo taken 06-06-2016.
- Image has not been altered.

- Overview of block design used on 16th Street Mall flanked by two original colored planters.
- Facing northeast.
- Photographed by James Steely.
- Photo taken 06-06-2016.
- Image has not been altered.

- Overview of block design used on 16th Street Mall.
- Facing unknown direction.
- Photograph courtesy of the Denver Post (2012).
- Photo taken in 1981.
- Image has not been altered.

- Overview of 16th Street Mall, including original colored planters, post lanterns, tree configuration, and the last remaining telephone booth in the project area (center background).
- Facing northwest.
- Photographed by James Steely.
- Photo taken 06-06-2016.
- Image has not been altered.

- Overview of a typical 16th Street Mall original post lantern.
- Close up.
- Photographed by James Steely.
- Photo taken 06-06-2016.
- Image has not been altered.

- Example of a Navajo diamond weaving pattern on a Phase III chief blanket from the 1930s.
- Photograph courtesy of the University of Colorado Museum of Natural History.
- Image has been cropped.

- Eastern diamondback rattlesnake.
- Photograph courtesy of Google Images (http://1.bp.blogspot.com/-bDG6zbjosXc/UFGGBKbe5wI/AAAAAAAAMEc/8ra53cOJgxM/s1600/Eastern+Diamondback+Rattlesnake+Crotalus+adamanteus+September+2011+Phillip's+Natural+World+ready+to+strike.jpg).
- Image has not been altered.

Attachment 3
Section 106 Consultation
Record Summary

Section 106 Communications Log

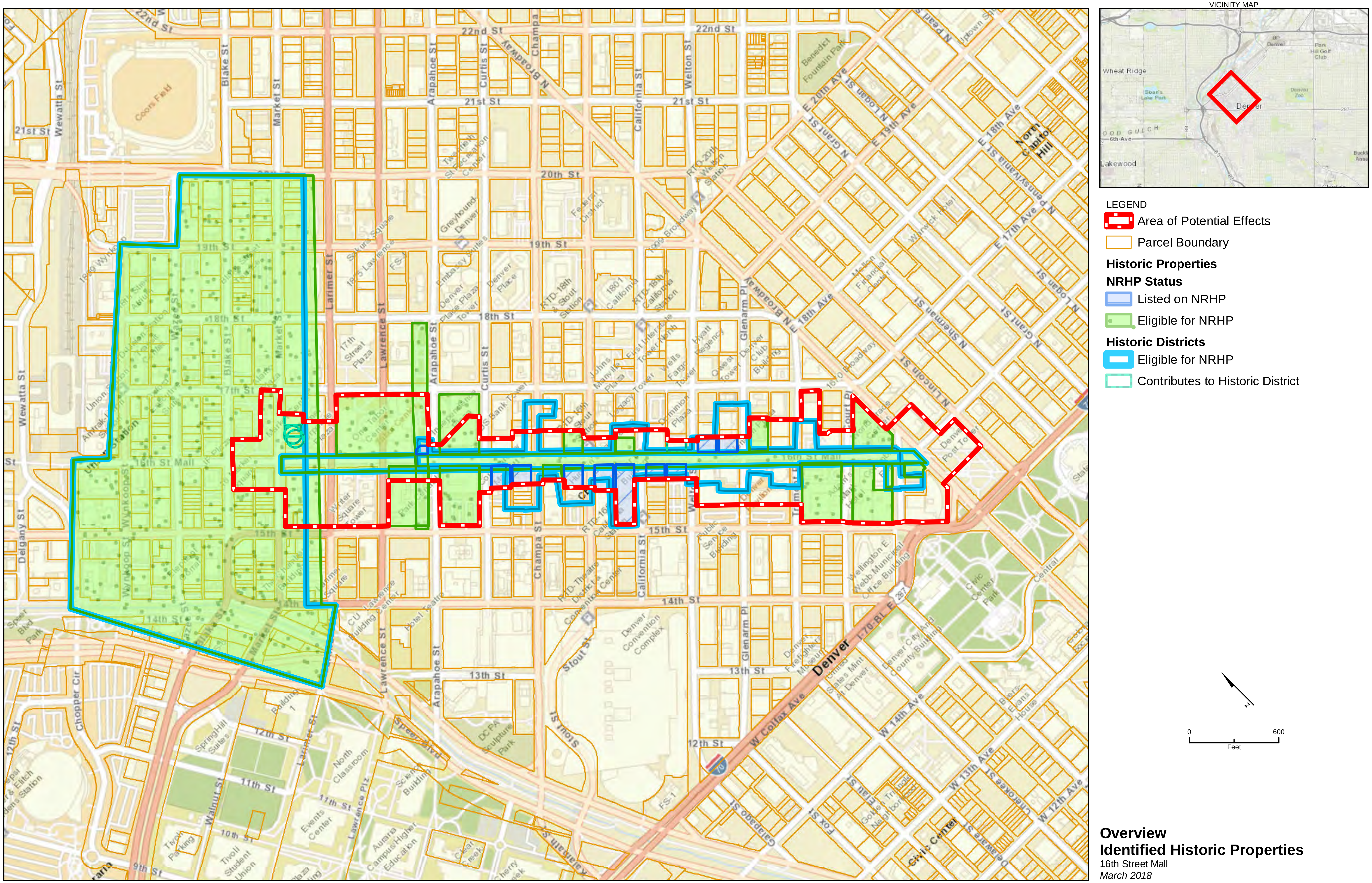
Date	From	To	Subject	Summary
6/2/2015	FTA	SHPO	Initiation of Section 106 Consultation; RTD 16th Street Mall Transit-way Rehabilitation Project	Initiation of Section 106 consultation process and invitation of consultation under 36 CFR 800.3 for the proposed 16th Street Mall transit-way rehabilitation project.
6/2/2015	FTA	Kiowa	Invitation to Consult: FTD 16th Street Mall Transit-way Rehabilitation Project	FTA with RTD invites Kiowa Tribe of Oklahoma to serve as a historic consulting party under Section 106 of the National Historic Preservation Act for the RTD 16th Stree Mall Transit-way Rehabilitation Project.
6/19/2015	SHPO	FTA	RE: Initiation of Section 106 Consultation; RTD 16th Street Mall Transit-way Rehabilitation Project	SHPO received initiation letter and looks forward to working together going forward.
6/22/2017	RTD-FTA	CPs	16th Street Mall Alternatives Analysis and Environmental Clearance - Workshop No. 1	Provides agenda for Workshop No. 1 (6/28-6/30/2017). The 3 planned workshops will be equivalent to 1 year of monthly meetings and allow, if a preferred alternative is selected, for design and construction to proceed and be completed within the next 5 years.
6/23/2017	FTA	SHPO	Re-Initiation of Consultation (HC No. 68388) The Future of Denver's 16th Street Mall: Alternatives Analysis and Environmental Clearance Project	FTA with RTD is preparing an EA for the 16th Street Mall. Provides a description of undertaking. Improvement project has been expanded from 3.5 blocks to a proposed 12 block area. Project area now includes transitway, sidewalks, and pedestrian areas. Area of potential effects (APE) is being reconsidered. Once the APE has been defined, Section 106 process will be updated. Extends an invitation to participate to the consulting parties involved with the previous project.
7/20/2017	RTD-FTA	Consulting Parties	July 25, 2017 Consulting Party Meeting Materials	Provides materials for the 7/25/2017 consulting party meeting.
7/27/2017	HistDen	FTA & RTD	RE: July 25, 2017 Consulting Party Meeting Materials	HistDen and CPI looked at the proposed problem statement, purpose, and need upon request. Offer two options.
8/11/2017	RTD-FTA	Consulting Parties	16th Street Mall Section 106 Consulting Parties Meetings	Invitation for two 16th Street Mall Section 106 consulting parties meetings (9/6/17 and 9/27/17). Provides most current purpose and need. Notification of upcoming send out of agenda and materials.
8/23/2017	RTD-FTA	Consulting Parties	16th Street Mall, Consulting Party Meeting, 09/06/17	Provides materials for the 9/6/2017 meeting. Provides 2 project examples where a project is contained entirely within a historic property.
9/5/2017	HistDen	Consulting Parties	RE: 16th Street Mall, Consulting Party Meeting, 09/06/17 [EXTERNAL]	Request for additional updates/materials prior to meeting.
9/5/2017	RTD-FTA	Consulting Parties	RE: 16th Street Mall, Consulting Party Meeting, 09/06/17 [EXTERNAL]	Provides updated agenda and update on the Olin sketches.
9/15/2017	RTD-FTA	Consulting Parties	16th Street Mall Section 106 Consulting Parties Meeting No. 3	Provides a reminder for the Consulting Parties Meeting No. 3 (9/27/2017) and informs that the agenda and materials will be sent the following week.
9/18/2017	RTD-FTA	Consulting Parties	16th Street Mall Section 106 Consulting Parties documents	Provides meeting notes from the 9/06/2017 meeting and agenda for 9/27/2017 meeting.
9/21/2017	RTD-FTA	Consulting Parties	16th Street Mall Workshop No. 2	Invitation to the workshop on 10/2/2017. Provides drawings, comments, and a draft future statement.
9/22/2017	RTD-FTA	Consulting Parties	RE: 16th Street Mall Section 106 Consulting Parties documents	Provides presentation for meeting (9/27/2017) and Level 1 Alternatives Analysis for Alignment Alternatives.
9/25/2017	RTD-FTA	Consulting Parties	RE: 16th Street Mall Section 106 Consulting Parties follow up	Provides the 2014 16th Street Pilot Repair final report and informs that a comparative cost analysis for various pavement materials has yet to be completed but is scheduled for November.
10/12/2017	HistDen	RTD-FTA	RE: 16th Street Mall Section 106 Consulting Parties Meeting No. 3 Notes [EXTERNAL]	Request for graphics for various paver pattern studies.
10/12/2017	RTD-FTA	Consulting Parties	RE: 16th Street Mall Section 106 Consulting Parties Meeting No. 3	Provides link to the Drop Box containing 5 requested items. Informs that RTD is working on the claims data on pedestrian and transit incidents.

Section 106 Communications Log

Date	From	To	Subject	Summary
10/12/2017	RTD-FTA	Consulting Parties	16th Street Mall Section 106 Consulting Parties Meeting No. 3 Notes	Provides meeting notes from the 9/27/2017 consulting party meeting. Attachment includes agenda and sign-in sheet but not final presentation since it was delivered directly after the meeting. Informs parties about a new Drop Box for delivery of materials.
10/18/2017	FTA	HistDen	RE: Comments on Form 1403 [EXTERNAL]	Confirms receipt of comments from HistDen.
10/18/2017	HistDen	RTD-FTA	Comments on Form 1403 [EXTERNAL]	Provides 7 comments on the 1403 form.
10/25/2017	RTD-FTA	Consulting Parties	FW: Comments on Form 1403 [EXTERNAL]	Provides 7 comments on the 1403 form to the Consulting Parties.
10/25/2017	RTD	RTD-FTA	RE: Comments on Form 1403 [EXTERNAL]	Allows delivery of comments to the consulting parties group.
11/7/2017	HistDen	RTD & FTA	16th Street Mall Letter	Informs the management team that the attached letter was sent to RTD.
11/30/2017	RTD-FTA	Consulting Parties	16th Street Mall Consulting Parties Meeting No. 4	Provides the meeting notes and materials from the 11/14/2017 meeting. Informs that a separate email will be sent with the agenda, materials, and presentation for the 12/14/2017 meeting.
12/15/2017	RTD	HistDen	RE: 16th Street Mall Project; November 7, 2017 Historic Denver Letter	Confirms receipt of 11/7/2017 letter regarding the 16th Street Mall project. Invitation to join the next consulting parties meeting (01/11/18).
1/22/2018	RTD	NTHP	RE: 16th Street Mall Purpose and Need [EXTERNAL]	Provides purpose and need statement for the project to NTHP and provides contact information.
1/26/2018	HistDen	RTD & FTA	Additional Comments on 1403 [EXTERNAL]	Provides additional comments and explanations on the Form 1403.
1/31/2018	RTD	HistDen	RE: Additional Comments on 1403 [EXTERNAL]	Confirms receipt of comments.
2/8/2018	RTD	FTA	RE: Comments on Form 1403 [EXTERNAL]	RTD has not received any comments (beyond HistDen) on the Form 1403.
2/9/2018	NTHP	RTD-FTA	RE: 16th Street Mall Purpose and Need [EXTERNAL]	Requests details and materials for the 2/27/2018 meeting. Informs Betsy will be replacing Jenny as point of contact for the NTHP.
2/12/2018	RTD	FTA	RE: Comments on Form 1403 [EXTERNAL]	Informs RTD did not directly receive any comments on the Form 1403.
2/22/2018	Postmaster	C-A Tribes	Undeliverable: 2/27/18 Consulting Party Meeting	Undeliverable email notification.

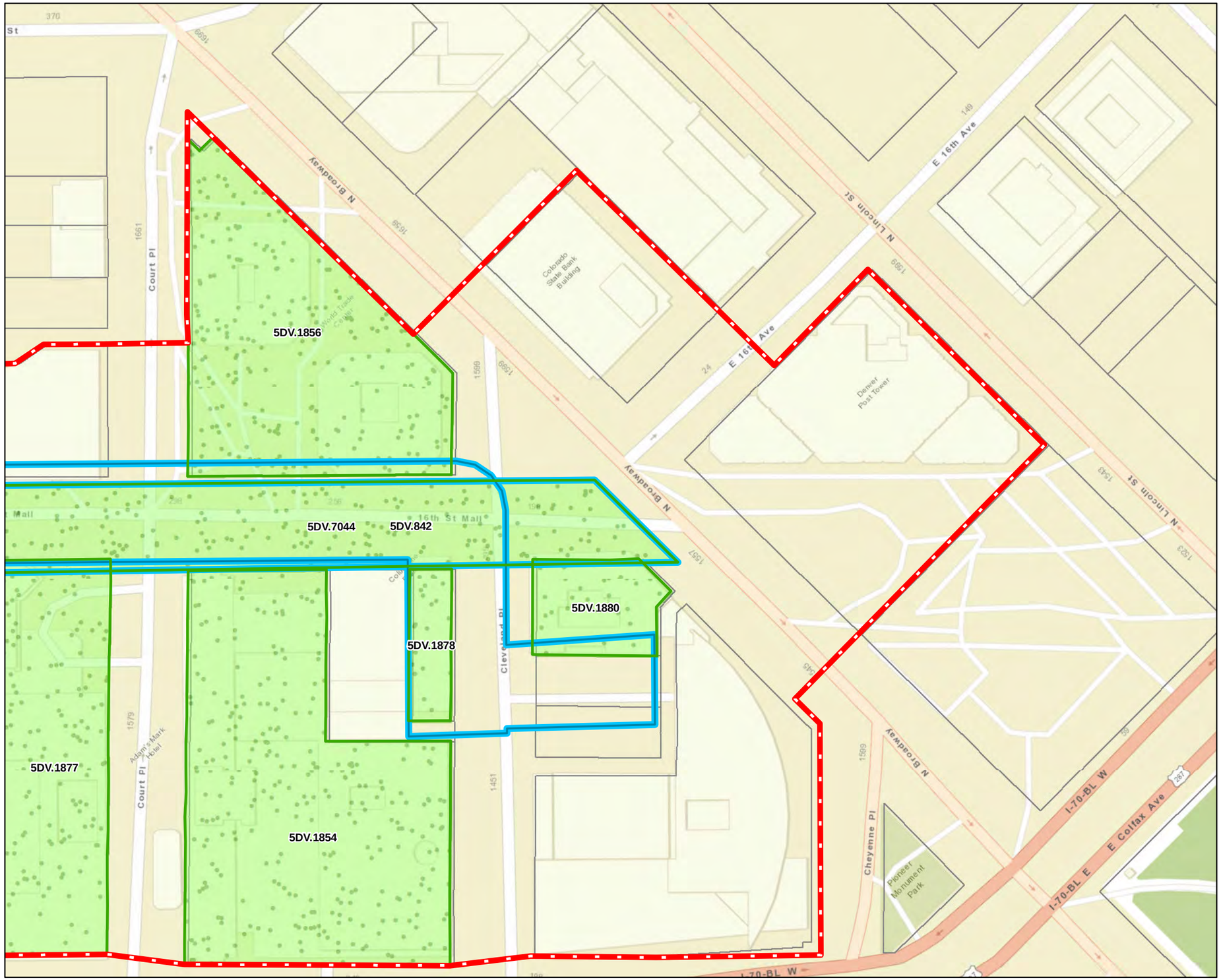
Section 106 Consultation Record through 3/8/2014

Attachment 4
Historic Properties Map Book

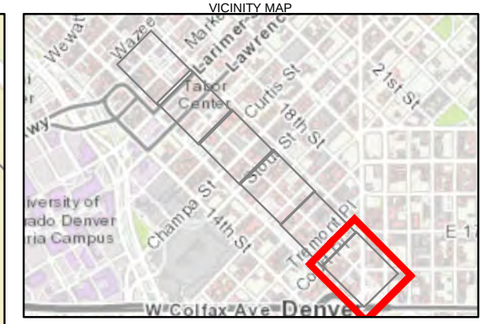


Overview
Identified Historic Properties
16th Street Mall
March 2018

ch2m.



VICINITY MAP



LEGEND

- Area of Potential Effects
- Parcel Boundary

Historic Properties

NRHP Status

- Listed on NRHP
- Eligible for NRHP

Historic Districts

- Eligible for NRHP
- Contributes to Historic District

N

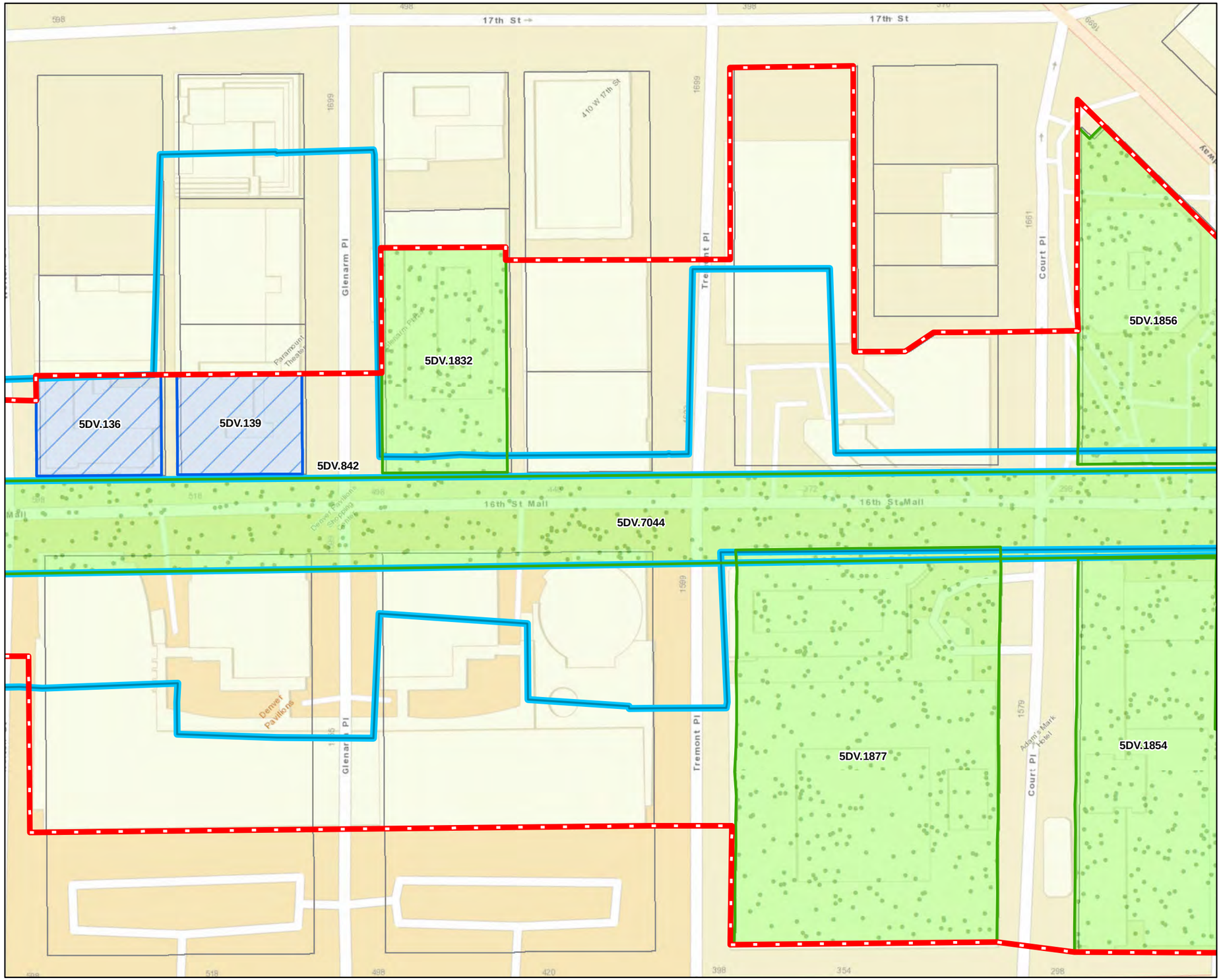
0 100
Feet

Map Book 1
Identified Historic Properties

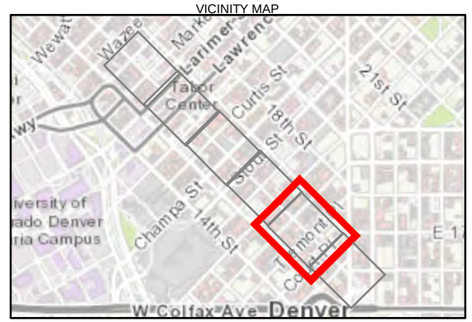
16th Street Mall

March 2019

ch2m



VICINITY MAP



LEGEND

- Area of Potential Effects
- Parcel Boundary

Historic Properties

NRHP Status

- Listed on NRHP
- Eligible for NRHP

Historic Districts

- Eligible for NRHP
- Contributes to Historic District

N

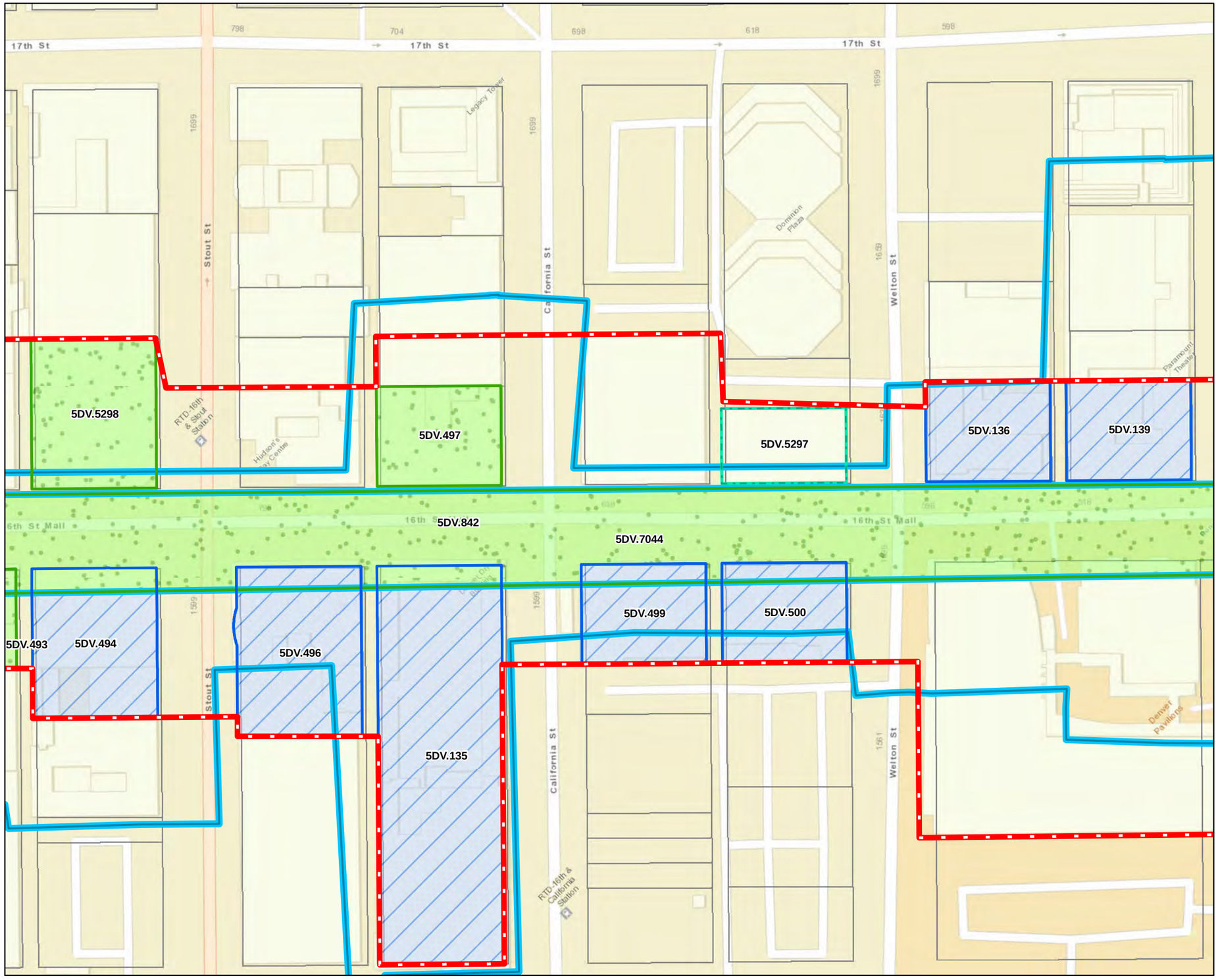
0 100
Feet

Map Book 2
Identified Historic Properties

16th Street Mall

March 2019

ch2m



VICINITY MAP

LEGEND

- Area of Potential Effects
- Parcel Boundary

Historic Properties

NRHP Status

- Listed on NRHP
- Eligible for NRHP

Historic Districts

- Eligible for NRHP
- Contributes to Historic District

N

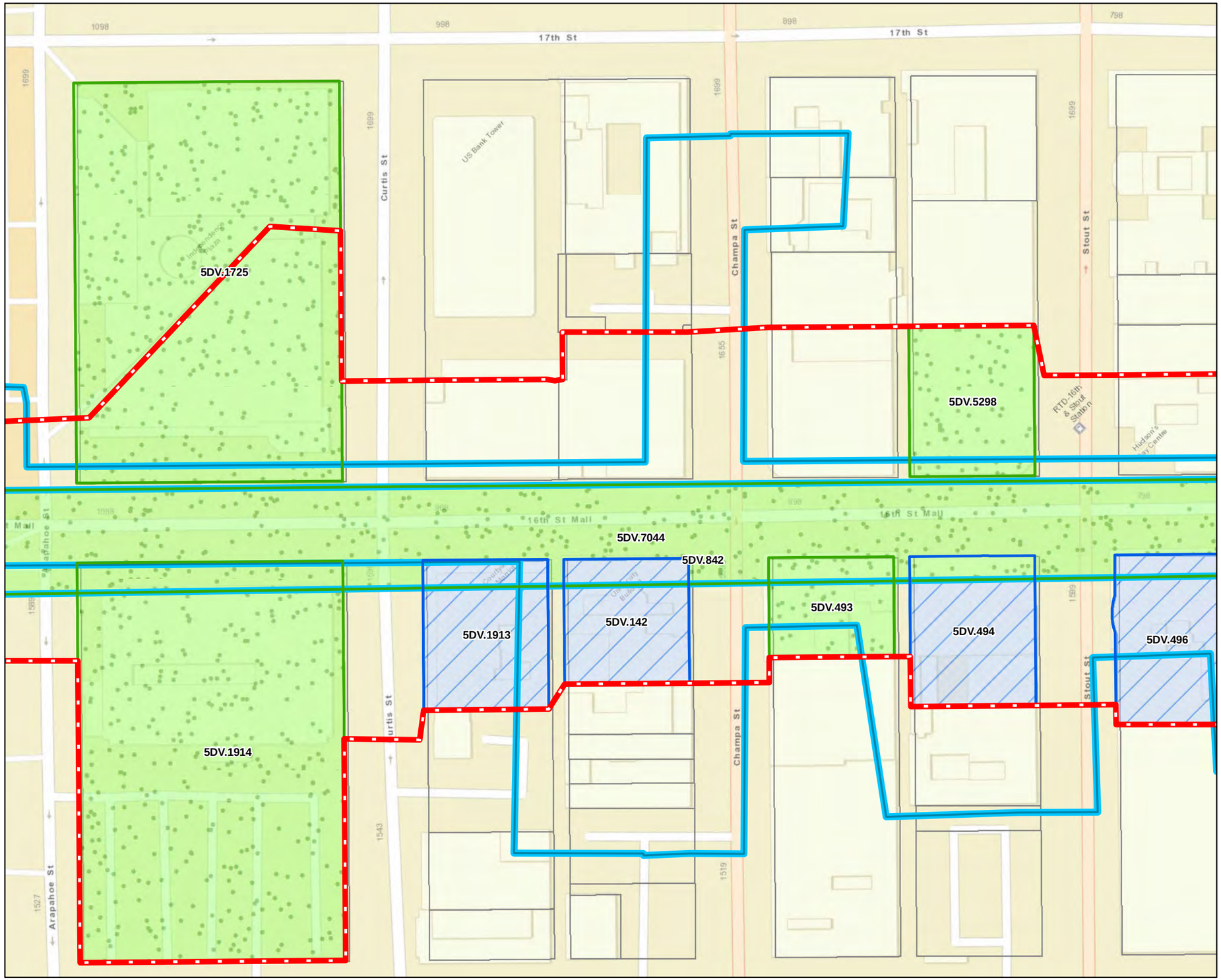
0 100
Feet

Map Book 3
Identified Historic Properties

16th Street Mall

March 2019

ch2m.



VICINITY MAP

LEGEND

- Area of Potential Effects
- Parcel Boundary

Historic Properties

NRHP Status

- Listed on NRHP
- Eligible for NRHP

Historic Districts

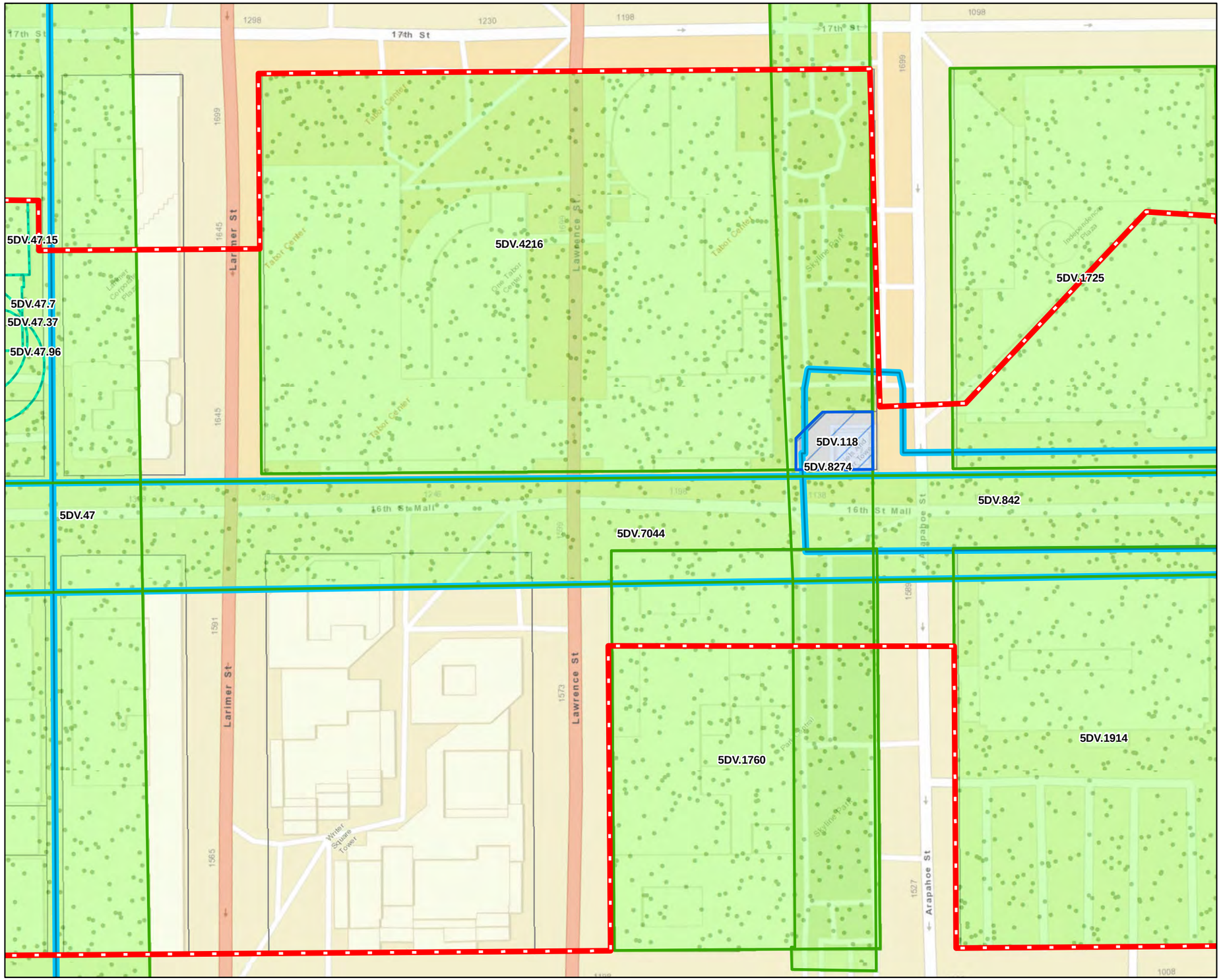
- Eligible for NRHP
- Contributes to Historic District

0 100
Feet

Map Book 4
Identified Historic Properties

16th Street Mall

March 2019



VICINITY MAP

LEGEND

- Area of Potential Effects
- Parcel Boundary

Historic Properties

NRHP Status

- Listed on NRHP
- Eligible for NRHP

Historic Districts

- Eligible for NRHP
- Contributes to Historic District

N

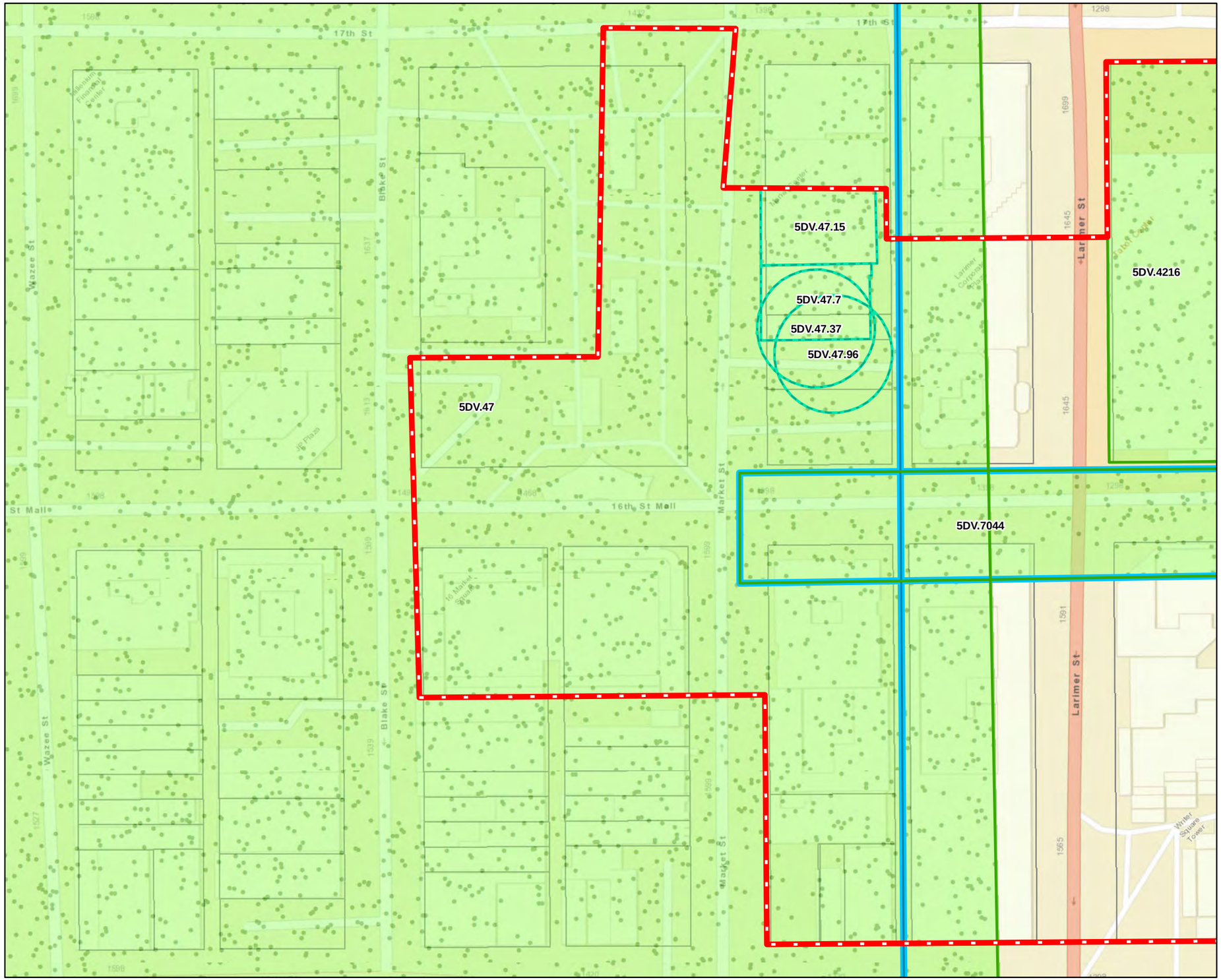
0 100
Feet

Map Book 5
Identified Historic Properties

16th Street Mall

March 2019

ch2m



VICINITY MAP

LEGEND

- Area of Potential Effects
- Parcel Boundary

Historic Properties

NRHP Status

- Listed on NRHP
- Eligible for NRHP

Historic Districts

- Eligible for NRHP
- Contributes to Historic District

N

0 100
Feet

Map Book 6
Identified Historic Properties

16th Street Mall

March 2019

ch2m.

Attachment 5
Table of Historic Properties within the APE

Site ID	Site Name	Site Address	Construction Date	NRHP Eligibility	Site Photo
5DV.118	Daniels & Fisher Tower ~ Daniels, Fisher & Company (Dry Goods) ~ May D&F Tower	1101 16th Street 1601 Arapahoe Street	1911-1911	Listed on NRHP	
5DV.135	Denver Dry Goods Company Building ~ The Denver Dry Goods Building	702 16th Street California Street and 16th Street	1888-1889	Listed on NRHP	
5DV.136	Masonic Temple Building	1614 Welton Street 535 16th Street	1889-1890	Listed on NRHP	

Site ID	Site Name	Site Address	Construction Date	NRHP Eligibility	Site Photo
5DV.139	Kittredge Building	511 16th Street	1889-1891	Listed on NRHP	
5DV.142	A.C. Foster Building ~ University Building	910-918 16th Street	1911-1911	Listed on NRHP	
5DV.1725	Independence Plaza Prudential Plaza	1001 16th Street 1050 17th Street	1971	NRHP-eligible	

Site ID	Site Name	Site Address	Construction Date	NRHP Eligibility	Site Photo
5DV.1760	Bridgepoint Plaza Park Central	1110 16th Street 1515 Arapahoe Street 1111 15th Street	1973	NRHP-eligible	
5DV.1832	Security Life Building ~ 1600 Glenarm Place	1600-16 Glenarm Place	1965-1965	NRHP-eligible	
5DV.1854	Hilton Hotel; Radisson Hotel; Adams Mark Hotel	1550 Court Place	1958-1960	NRHP-eligible	

Site ID	Site Name	Site Address	Construction Date	NRHP Eligibility	Site Photo
5DV.1856	Dome Tower ~ Great West Plaza ~ World Trade Center	1625 Broadway	1980->1980	NRHP-eligible	
5DV.1877	Zeckendorf Plaza; May D & F Plaza; Hyperbolic Paraboloid; Adams Mark Hotel; Sheraton Hotel	350 16th Street 1550 Court Place	1960-1960>1960	NRHP-eligible	
5DV.1878	Colorado Federal Savings, McDonald's	200 16th Street	1957-1958	NRHP-eligible	

Site ID	Site Name	Site Address	Construction Date	NRHP Eligibility	Site Photo
5DV.1880	Petroleum Club Building ~ Petroleum Building ~ 110 Building	110 16th Street	1954-1957	NRHP-eligible	
5DV.1913	Joslin Dry Goods Company Building ~ Tritch Building ~ Savoy Grille ~ Joslin Building ~ Marriott Courtyard Hotel	934-938 16th Street	1887-1887	Listed on NRHP	
5DV.1914	Federal Reserve	1020 16th Street	1968-	NRHP-eligible	

Site ID	Site Name	Site Address	Construction Date	NRHP Eligibility	Site Photo
5DV.47	Lower Downtown Denver Historic District	Multiple		NRHP-eligible	
5DV.47.15	Waters Building ~ Market Center	1642 - 1644 Market Street	1885-1885	Contributes to NPS Certified District > Within official eligible district	

Site ID	Site Name	Site Address	Construction Date	NRHP Eligibility	Site Photo
5DV.47.37	Hitchings Block	1620 Market Street	1890-1899	Contributes to NPS Certified District > Within official eligible district	
5DV.47.7	Liebhardt-Lindner Building ~ Market Center	1624 Market Street	1881-1881	Contributes to NPS Certified District > Within official eligible district	

Site ID	Site Name	Site Address	Construction Date	NRHP Eligibility	Site Photo
5DV.47.96	McCrary Block ~ Market Center	1626-32 Market Street	1884-1884	Contributes to NPS Certified District > Within official eligible district	
5DV.493	Symes Building; F.W. Woolworth Company	820 16th Street	1905-1905	NRHP-eligible	

Site ID	Site Name	Site Address	Construction Date	NRHP Eligibility	Site Photo
5DV.494	A.T. Lewis And Son Department Store ~ Holtzman And Appel Block	800-816 16th Street	1891-1891	Listed on NRHP	
5DV.496	Neusteter Building ~ Neusteter's	720-726 16th Street	1924-1924	Listed on NRHP	
5DV.497	Hayden, Dickinson & Feldhauser Building~ Colorado Building	1609-1615 California Street	1891-1891	NRHP-eligible	

Site ID	Site Name	Site Address	Construction Date	NRHP Eligibility	Site Photo
5DV.499	McClintock Building	1554 California Street	1911-1911	Listed on NRHP	
5DV.500	Steel's Department Store; Steel's Corner; Steel Building; Fontius Building; Sage Building	1555 Welton 600 16th Street	1922	Contributes to NPS Certified District > Within official eligible district	
5DV.5297	Liebhardt Building;Cottrell Clothing Company	601 16th Street	1915-	Contributes to NPS Certified District > Within official eligible district	

Site ID	Site Name	Site Address	Construction Date	NRHP Eligibility	Site Photo
5DV.5298	Walgreens	801 16th Street	1955-	NRHP-eligible	
5DV.7044	16th Street Mall	1-1300 16th Street	1982-1982	NRHP-eligible	
5DV.8274	Skyline Park	1500-1800 Arapahoe Street	1973-1973	NRHP-eligible	

Site ID	Site Name	Site Address	Construction Date	NRHP Eligibility	Site Photo
5DV. 842	16th Street Mall Historic District	Multiple	1982	NRHP-eligible	

Attachment 6
Pattern and Geometry Studies

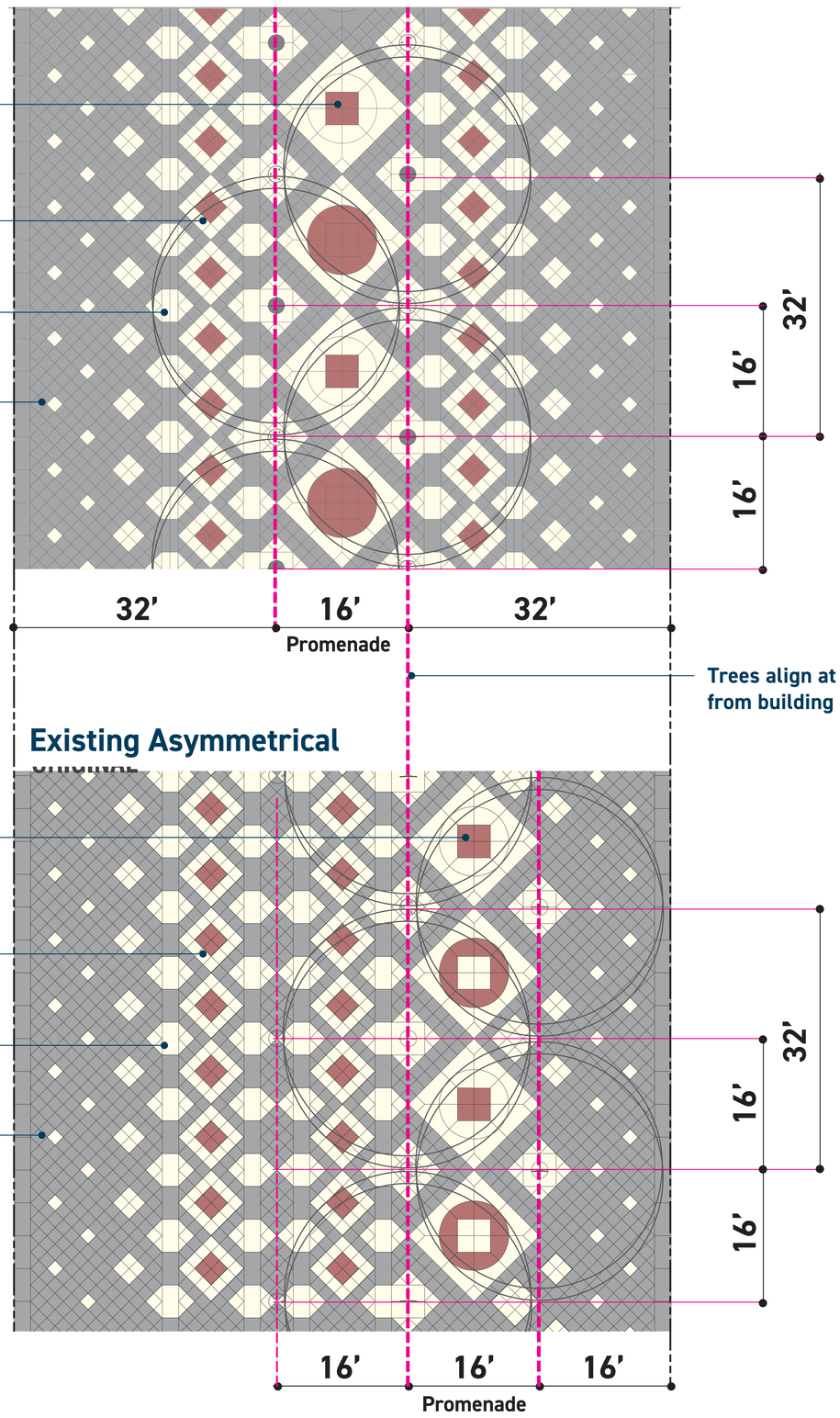
THE MALL EXPERIENCE
THE FUTURE OF DENVER'S 16TH STREET MALL
ALTERNATIVES ANALYSIS & ENVIRONMENTAL CLEARANCE

Pattern & Geometry Studies

Existing Configuration

BLOCK 5A

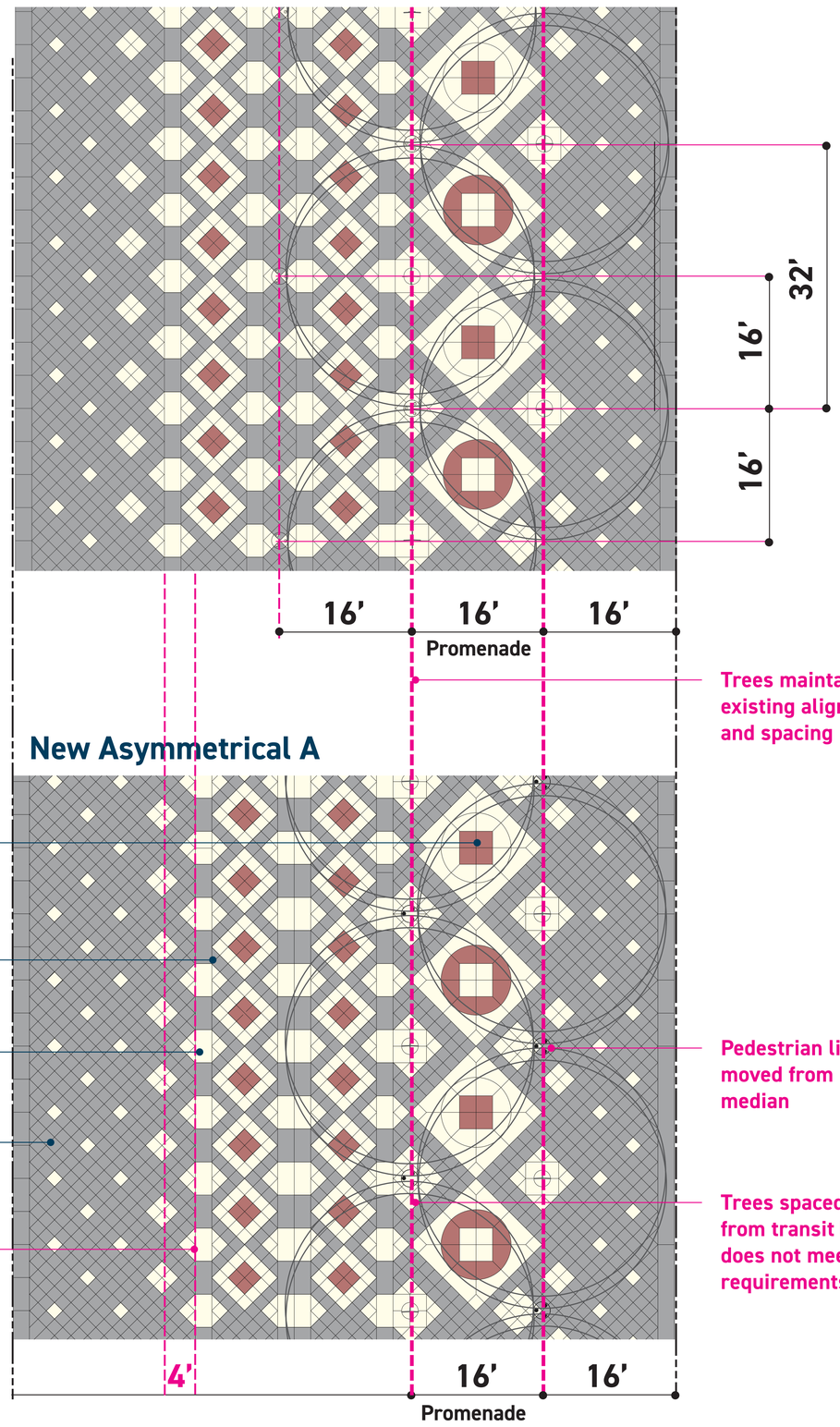
Existing Median



Existing Asymmetrical

Revised Asymmetrical

Existing Asymmetrical



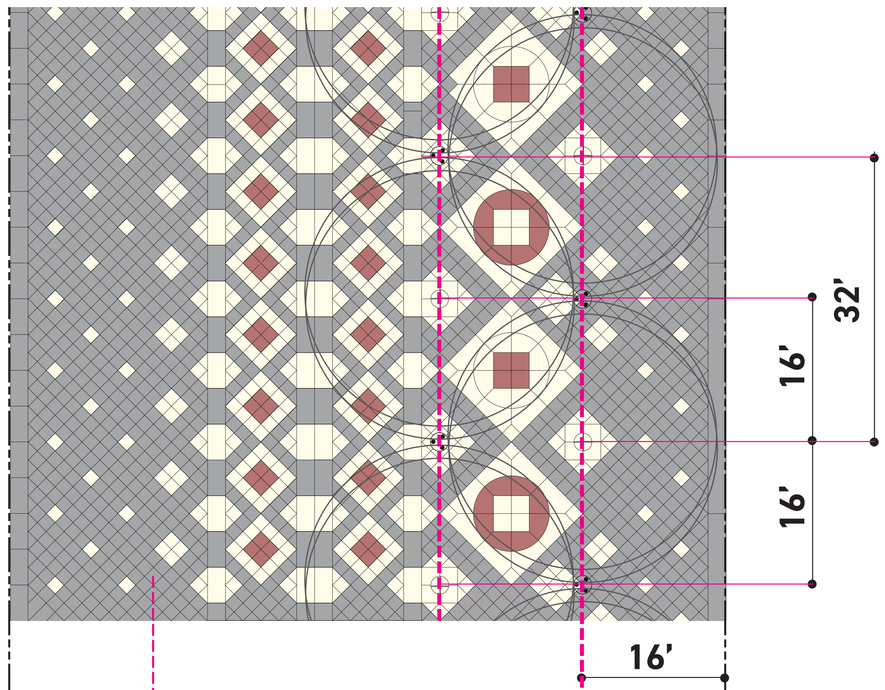
New Asymmetrical A

DENVER THE MILE HIGH CITY · RTD · DURA RENEW DENVER · BID Downtown Denver Business Improvement District · Downtown Denver Partnership, Inc. · Federal Transit Administration

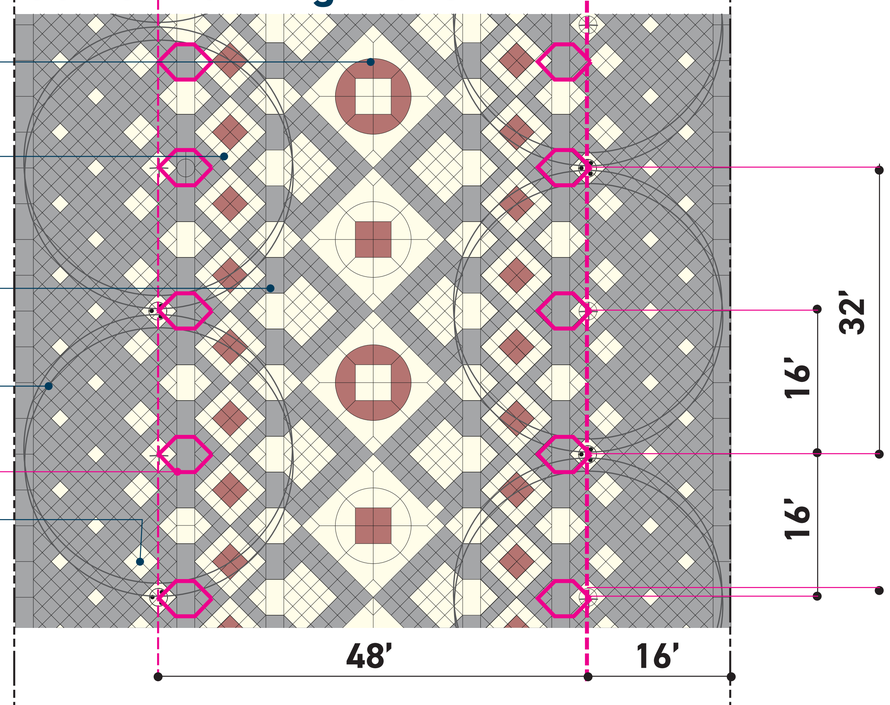
Maintain Spatial Relationships

Option 1: Prioritize Allee Alignment

New Asymmetrical



Center Running Transit



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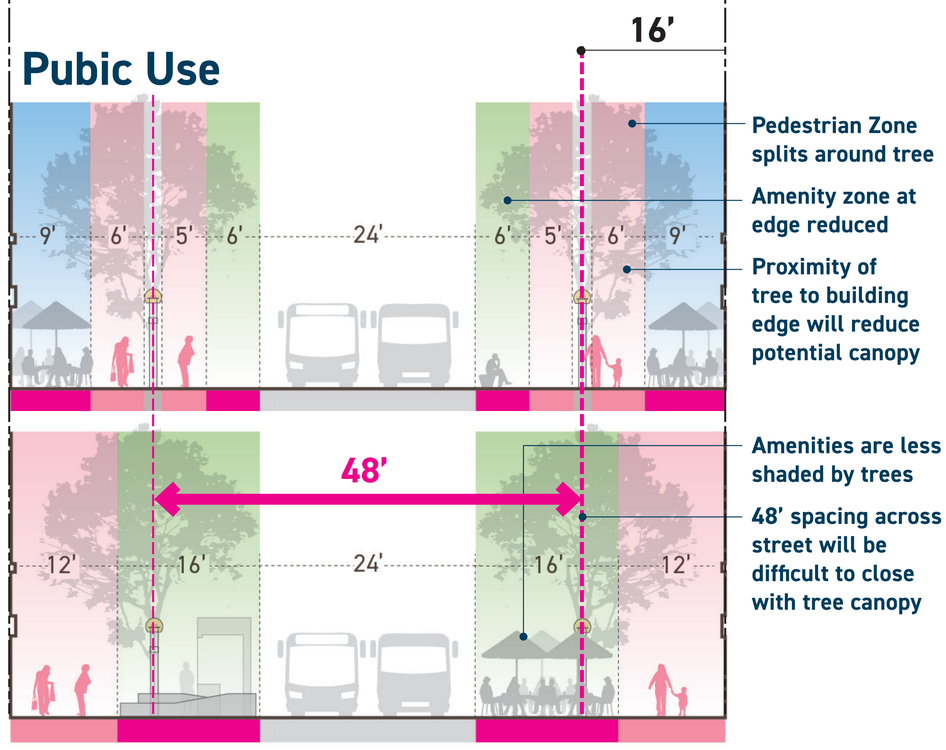
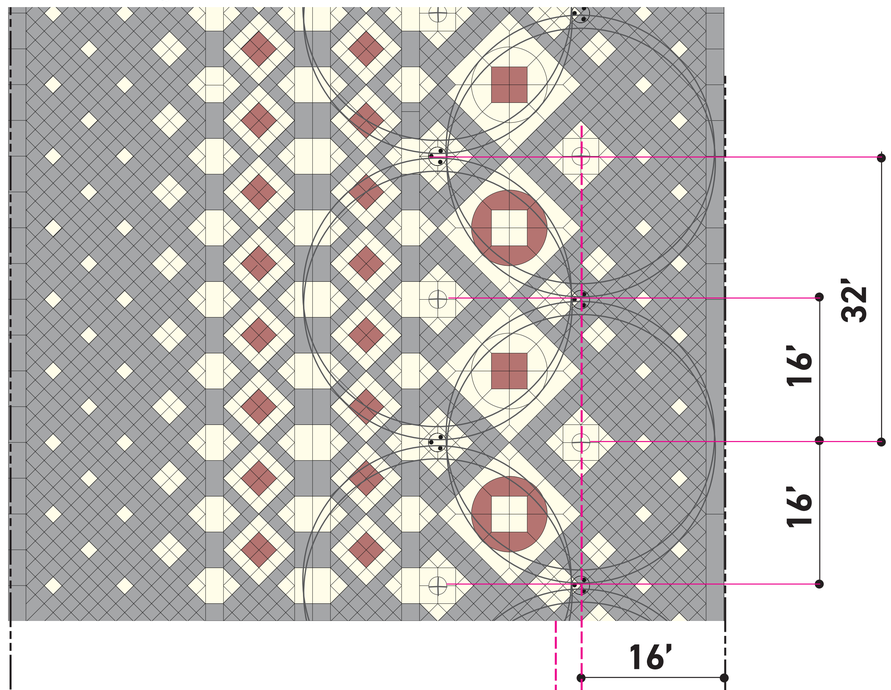


Option 2: Prioritize Pattern Consistency

New Asymmetrical



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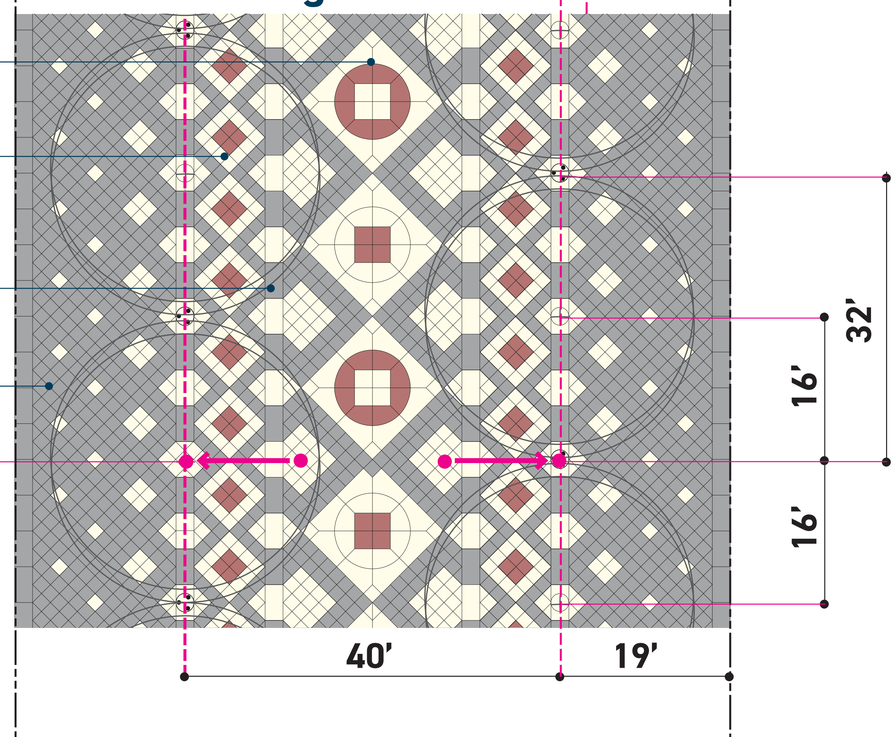

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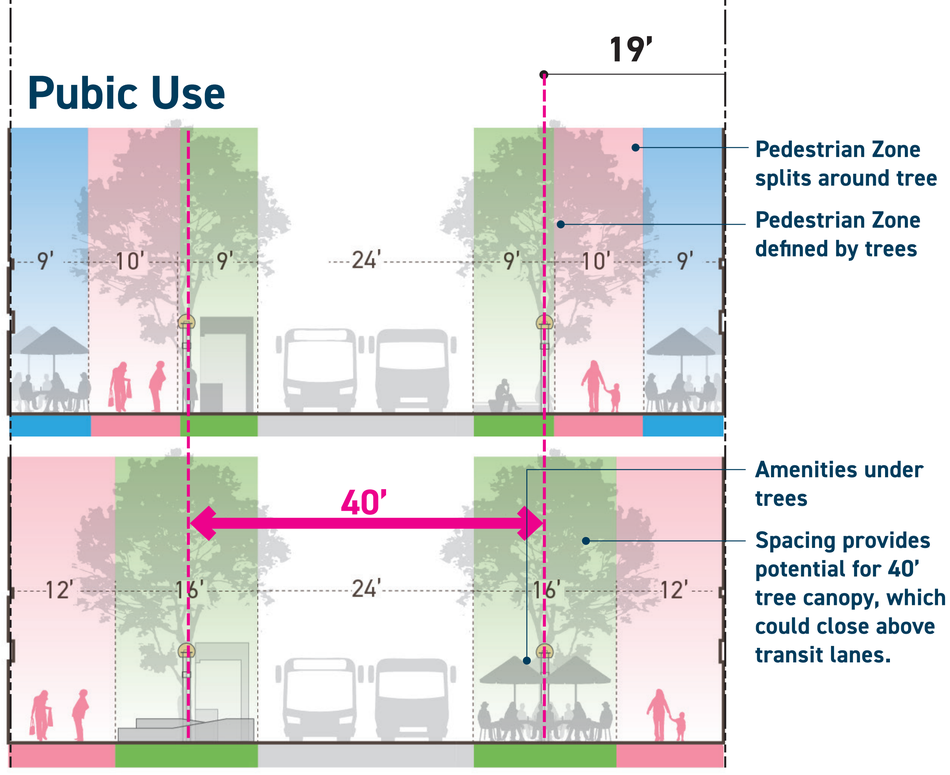
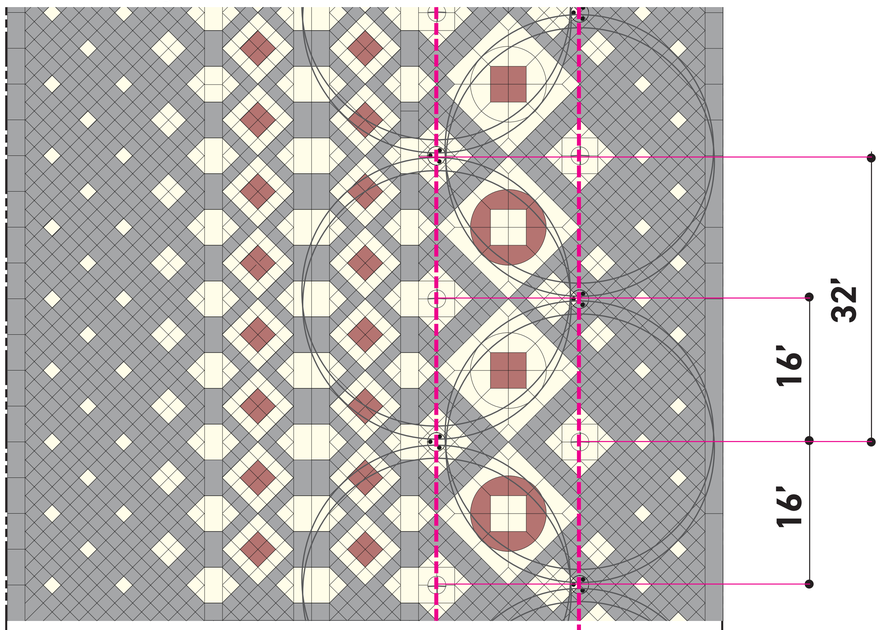


Maintain Programmatic Relationships

Option 1: Prioritize Allee Alignment

New Asymmetrical



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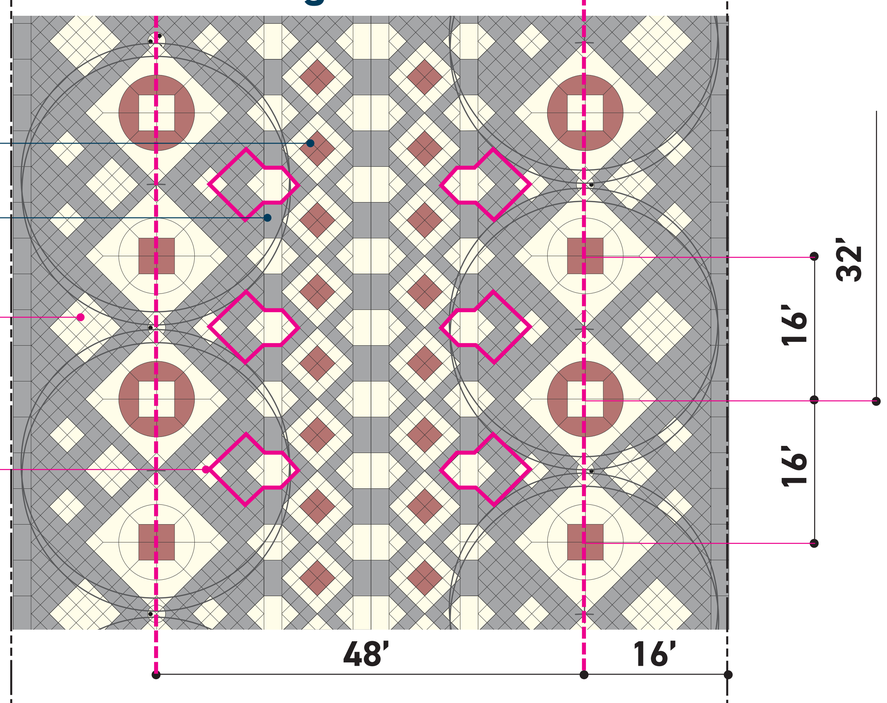

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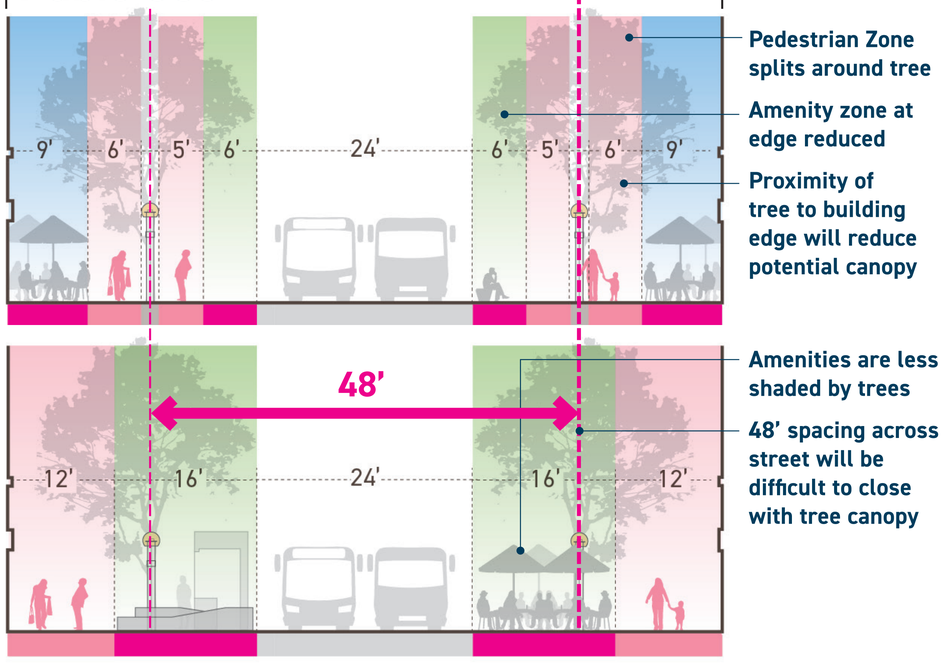
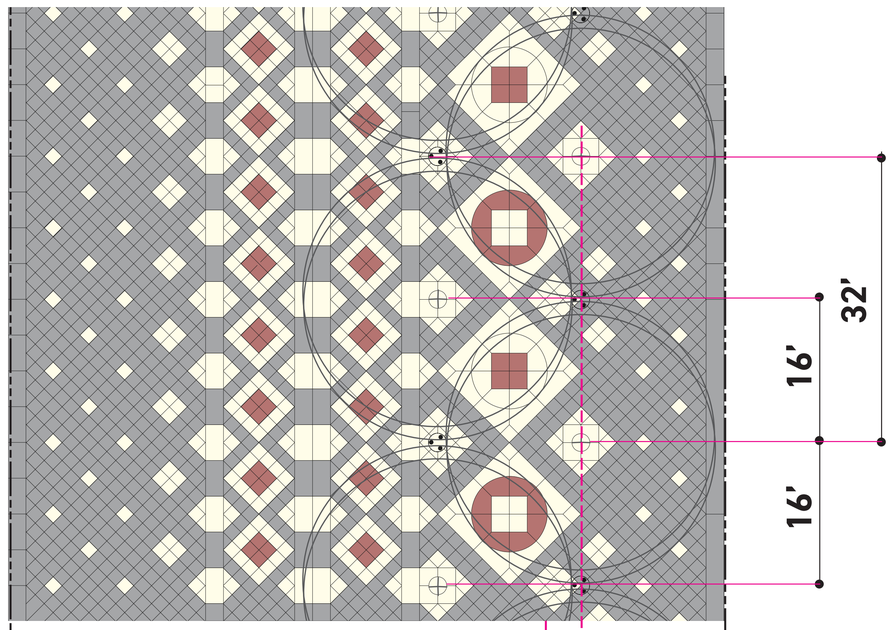
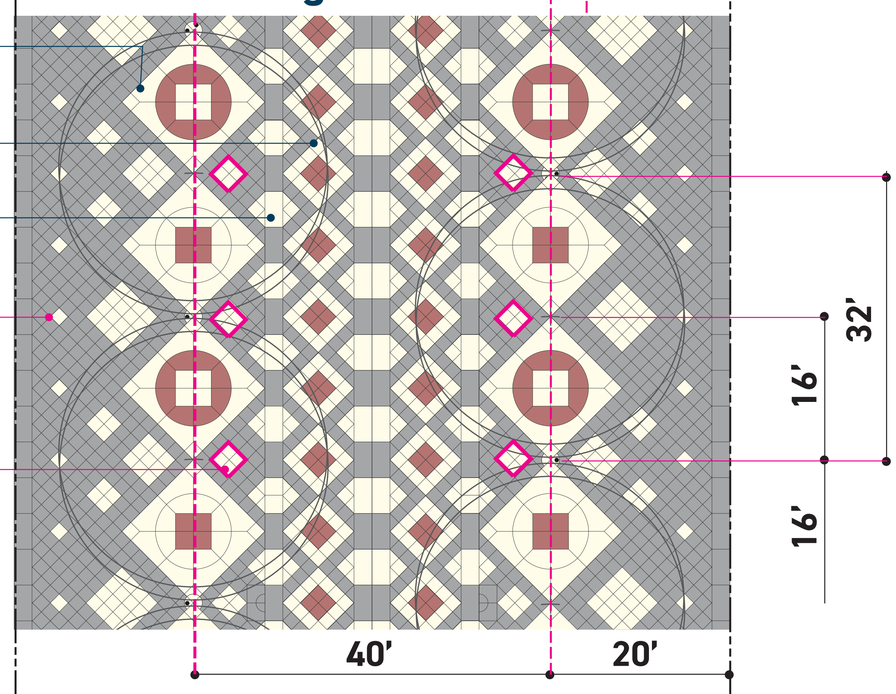


Option 2: Prioritize Pattern Consistency

New Asymmetrical



Center Running Transit



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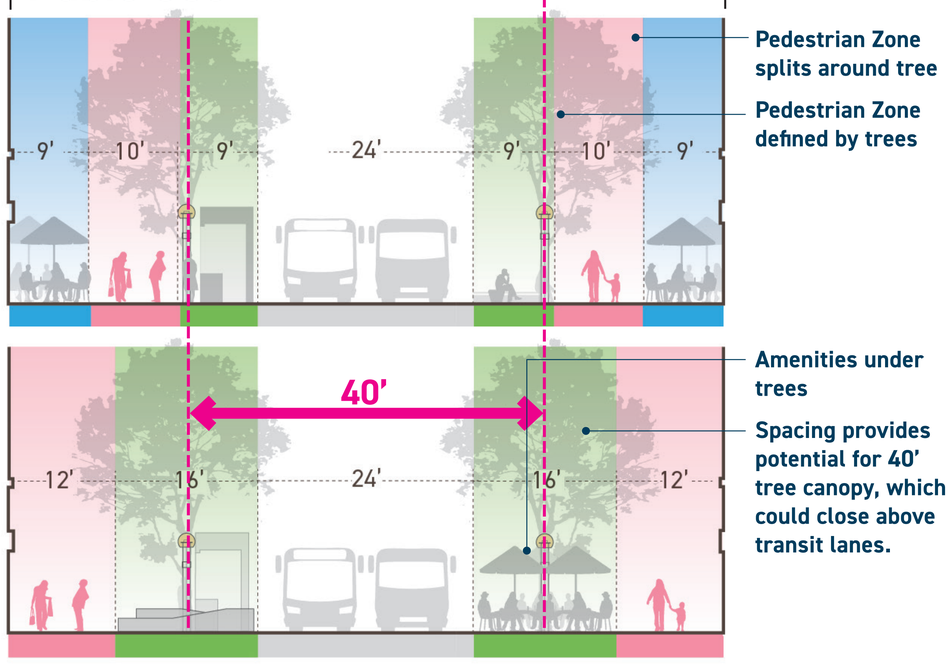
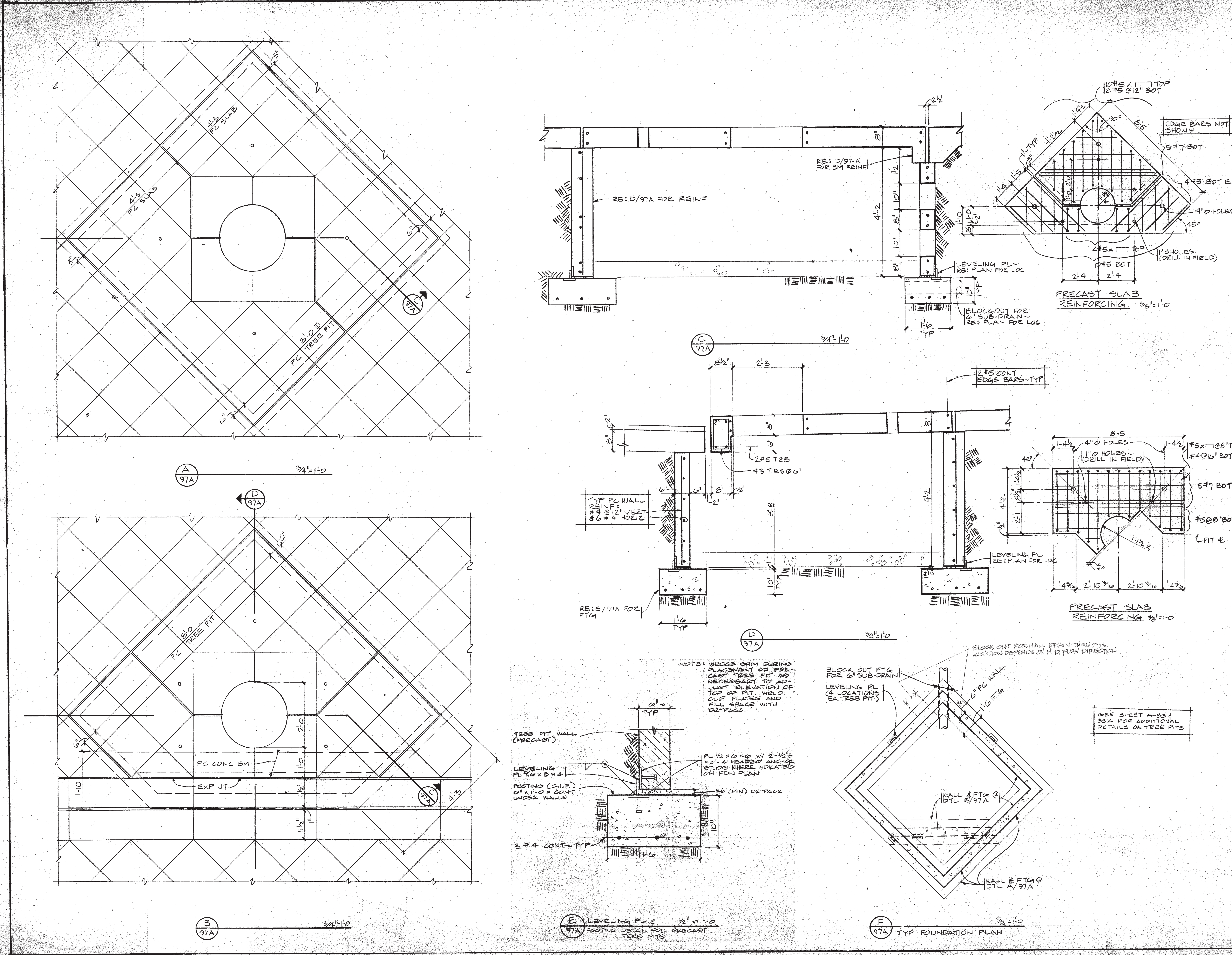


Attachment 7
Tree Box Design

PROJECT 16TH ST TRANSITWAY MALL
PROJECT MANAGER: JOHN MAAS
DESIGNED BY: DWL/MAN JOB NO 6102-05
DRAWN BY: A.FINN SHEET NO C97A



RTD
Regional Transportation District

16th Street

THE TRANSITWAY MALL
DENVER, COLORADO

I.M. Pei & Partners
Architects and Planners
New York, New York

KKBNA, Inc.
Civil/Structural Engineers
Denver, Colorado

Hanna/Olin
Landscape Consultant
Philadelphia, Pennsylvania

Phillip E. Flores Associates, Inc.
Landscape Architects
Denver, Colorado

Howard Brandston Lighting Design Inc.
New York, New York

Barton-Aschman Associates, Inc.
Transportation Consultants
Evanston, Illinois

Page, Arbitrio & Resen, Ltd.
Graphics
New York, New York

Registered Architect | Registered Engineer
Architect's and Engineer's Approval

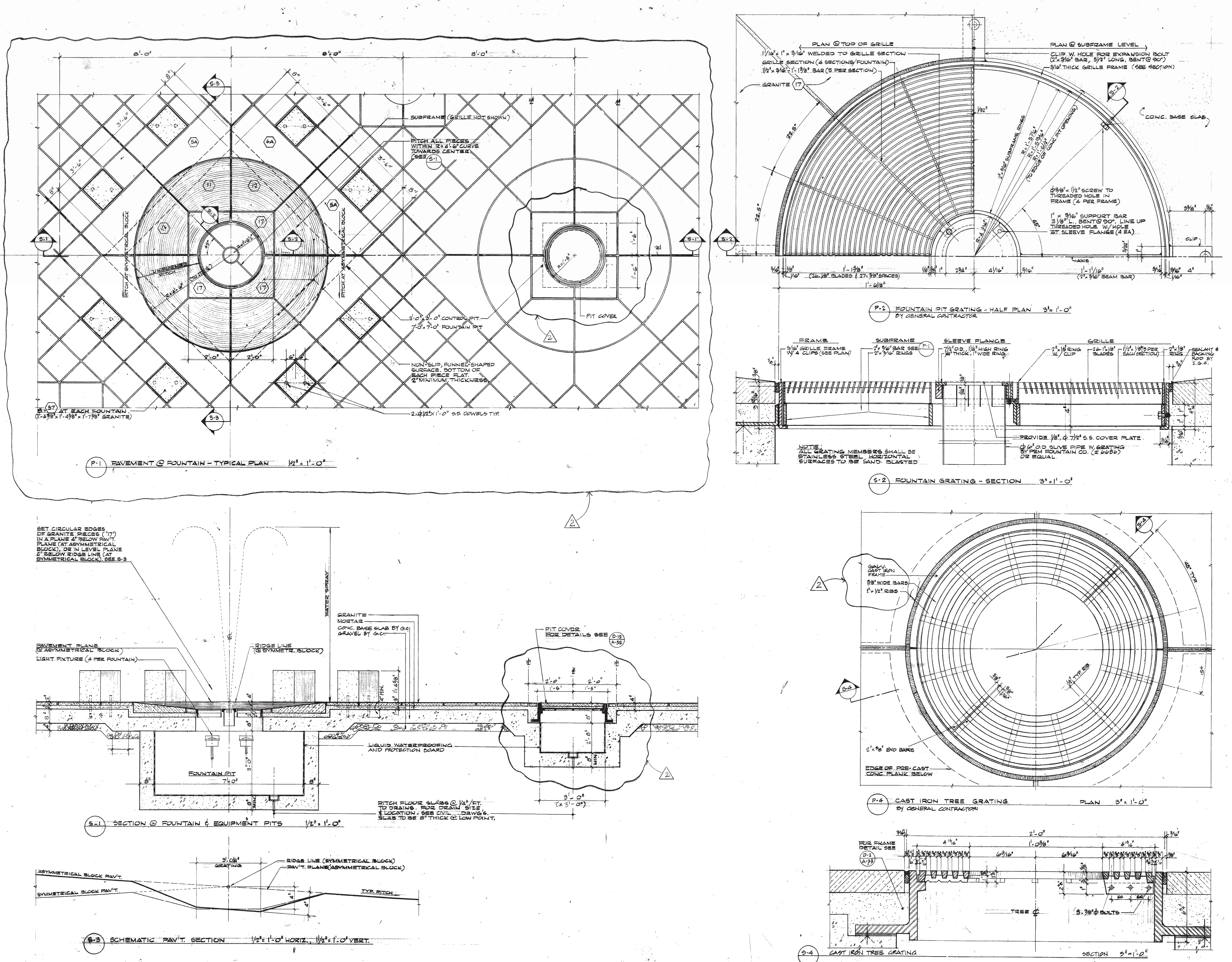
Drawn By S. FENTON
Checked By L.R.S. Date FEB. 15
Approved By H.B.B. Date FEB. 15
RTD Approvals

Revisions Date	Number	Description

Drawing Title
TREE PIT DETAILS

Sheet No.
C-97A
AS-BUILT

Revision No. | Date of Issue MAR. 31, 1980



RTD
Regional Transportation District

16th Street

THE TRANSITWAY MALL
DENVER, COLORADO

I.M. Pei & Partners
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Graphics
New York, New York

Registered Architect | Registered Engineer

Architect's and Engineer's Approval

Drawn By A.M.

Checked By | Date

Approved By | Date

RTD Approval

Revisions

Date	Number	Description
3-12-80	1	REV. AS INDICATED & COMPLETED
4-15-80	2	REV. AS PER ADDENDUM NO. 3 TCO 7

Drawing Title

GRANITE DETAILS
SHEET 7

Sheet No.

A35

Revision No.
2

Date of Issue
3-31-80

Attachment 8
Tree Candidates

THE MALL EXPERIENCE
THE FUTURE OF DENVER'S 16TH STREET MALL
DESIGN & IMPLEMENTATION

Tree Candidates

Honeylocust and Similar

ID	Family	Botanical Name	Acceptable Cultivar	Common Name	Hardiness Zone	Moisture Level	Soil Salt Tolerance	Aerosol Salt Tolerance	Water Quality Area	Height at Maturity	Canopy Spread at Maturity	Growth Form/ Shape	Flowers	Leaf Color – Spring	Leaf Color – Fall	Subject to Change[a]	Additional Notes (includes compaction/tolerances/restrictions)
49	Bignoniaceae	Catalpa speciosa	–	Western Catalpa	5	Xeric to Min	Intermediate	Intermediate	Yes	50	35	Irregular pyramidal to rounded oval	Large, white flowers in spring to summer; showy	Green	Yellow	No	Heat, drought, and alkaline soil tolerant. Decay when wounded or as tree ages may be an issue.
15	Fabaceae	Gleditsia triacanthos inermis	Harve	Northern Acclaim Honeylocust	3b	Xeric	Tolerant	Tolerant	Yes	40	30	Broad pyramidal	Insignificant	Green	Yellow	No	Thornless and fruitless cultivar. Genus overplanted in Denver region.
7	Fabaceae	Gymnocladus dioicus	Espresso	Kentucky Coffeetree	4	–	Tolerant	Tolerant	Yes	–	–	Spreading vase	Greenish-white clusters in late spring	Blue-green	Yellow	Yes	Male (fruitless) cultivar. Tolerant of urban growing conditions. No known insect or disease issues. Leaves, seeds, and pulp reported to be poisonous if ingested.
16	Fabaceae	Gleditsia triacanthos inermis	Shademaster	Shademaster Honeylocust	4	Xeric	Tolerant	Tolerant	Yes	40	30	Vase to rectangular	Insignificant	Green	Yellow	Yes	Thornless and fruitless cultivar. Central leader less present than Skyline. Genus overplanted in Denver region.
52	Platanaceae	Platanus occidentalis	Bismarck	Northern Advance American Sycamore	3	Mod	Intermediate	Intermediate	Yes	75	60	Pyramidal to rounded	Insignificant	Green	Yellow	No	Cold hardy cultivar of parent species. Large root system requires large tree lawn. NDSU introduced – availability may be limited.
54	Platanaceae	Platanus x acerifolia	Morton Circle	Exclamation London Planetree	5	Mod	Intermediate	Intermediate	Yes	50	30	Pyramidal	Insignificant	Green	Yellow	No	Upper branches display showy bark. Cultivar more resistant to anthracnose than parent species. Large root system requires large tree lawn.
18	Sapindaceae	Koelreuteria paniculata	–	Goldenraintree	5	Xeric	Intermediate	Intermediate	Yes	30	30	Open, rounded vase	Yellow in summer, very showy	Green	Yellow	No	Volunteer seedlings could be an issue in mulched areas.
34	Fabaceae	Styphnolobium japonica	Halka	Millstone Japanese Pagodatree	5	Min	Intermediate	Intermediate	Yes	40	30	Broad oval to rounded	Creamy white in summer, showy	Dark green	Yellow	Yes	Tolerant of urban conditions, including heat, drought, and compacted soils. More upright branching habit than parent species. Greatest canker resistance of pagodatree species.
126	Rutaceae	Phellodendron amurense	Macho	Macho Amur Corktree	4	Min to mod	Intermediate	Intermediate	No	40	40	Upright to rounded	Green-white in spring, insignificant	Green	Yellow	No	Male, seedless cultivar of parent species. Large, shallow root system requires large tree lawn.

Shade Trees

ID	Family	Botanical Name	Acceptable Cultivar	Common Name	Hardiness Zone	Moisture Level	Soil Salt Tolerance	Aerosol Salt Tolerance	Water Quality Area	Height at Maturity	Canopy Spread at Maturity	Growth Form/ Shape	Flowers	Leaf Color – Spring	Leaf Color – Fall	Subject to Change[a]	Additional Notes (includes compaction/tolerances/restrictions)
11	Fagaceae	Quercus macrocarpa	JFS-KW14	Cobblestone Oak	3	Xeric	Intermediate	Intermediate	Yes	50	40	Broad oval	Insignificant	Dark green	Yellow	No	Bark displays more cork-like features than parent species.
130	Fagaceae	Quercus muehlenbergii	–	Chinkapin Oak	3	Mod	Intermediate	Intermediate	No	45	50	Upright oval to rounded	Insignificant	Yellow-green	Yellow	Yes	Tolerant of alkaline soils. Transplant in spring for best survival. Prune to develop central leader.
31	Ulmaceae	Celtis laevigata	All Seasons, Magnifica	Sugar Hackberry	5	Xeric to Min	Tolerant	Intermediate	Yes	45	40	Rounded vase to broad oval	Green in spring, insignificant	Dark green	Yellow	No	Varieties are more hardy than parent species. Magnifica has similar growth habit to elm and improved insect resistance.
47	Ulmaceae	Celtis occidentalis	Chicagoland	Common Hackberry	3	Xeric to Min	Tolerant	Intermediate to Sensitive	Yes	45	35	Rounded vase, strong central leader	Green in spring, insignificant	Green	Yellow	Yes	Tolerant of urban growing conditions. Nipple gall may be an aesthetic issue. Intolerant of mechanical damage. Transplant in spring (B&B).
25	Ulmaceae	Ulmus americana	Princeton	Princeton American Elm	4	Mod	Intermediate	Intermediate	Yes	60	45	Upright vase	Insignificant	Dark glossy green	Yellow	Yes	Fast growing cultivar. Resistant to Dutch elm disease and elm leaf beetle. Per CSU elm trials, tree may susceptible to scale. Prune to develop strong branching structure.
30	Ulmaceae	Ulmus (wilsoniana x pumila Accolade) x carpinifolia x glabra	Patriot	Patriot Elm	4	Mod	Tolerant	Tolerant	Yes	45	35	Upright, narrow vase	Insignificant	Dark green	Yellow	No	Fast growth rate. Highly resistant to Dutch elm disease. Per CSU elm trials, tree may be susceptible to scale. Not as drought tolerant as other hybrids. Prune to develop strong branching structure.
29	Ulmaceae	Ulmus glabra x carpinifolia	Pioneer	Pioneer Elm	4	Mod	Tolerant	Tolerant	Yes	50	45	Rounded	Insignificant	Dark green	Yellow	Yes	Resistant to Dutch elm disease. Highly susceptible to elm leaf beetle. Per CSU elm trials, tree may be susceptible to scale. Prune to develop strong branching structure.
23	Ulmaceae	Ulmus pumila x japonica x wilsoniana	Morton Glossy	Triumph Elm	4	Min to mod	Tolerant	Tolerant	Yes	50	40	Upright oval to vase	Insignificant	Dark glossy green	Yellow	No	Cold hardy. Excellent resistance to Dutch elm disease. Resistant to elm leaf beetle. Per CSU elm trials, tree may be moderately resistant to scale. Prune to develop strong branching structure.
24	Ulmaceae	Ulmus japonica x wilsoniana	Morton	Accolade Elm	4	Min to mod	Intermediate	Intermediate	Yes	60	50	Vase with arching limbs	Insignificant	Dark glossy green	Yellow	Yes	Cold hardy. Resistant to Dutch elm disease and elm leaf beetle. Per CSU elm trials, tree shows high scale resistance. Prune to develop strong branching structure.
92	Ulmaceae	Ulmus davidiana var. japonica	Discovery	Discovery Elm	3	Mod	Tolerant	Tolerant	No	40	30	Upright oval to arching vase	Insignificant	Dark green	Yellow	Yes	Slow growing, cold hardy variety. Resistant to Dutch elm disease and elm leaf beetle. Resitance to scale unknown. Large root system requires large tree lawn. Growth habit requires consistent crown-thinning. Prune to develop strong branching structure.
91	Ulmaceae	Ulmus pumila x hollandica x carpnifolia	Homestead	Homestead Elm	5	Min to mod	Tolerant	Tolerant	No	50	30	Pyramidal to oval	Insignificant	Dark green	Yellow	No	Fast growth rate. Resistant to Dutch elm disease. Susceptible to elm leaf beetle. Per CSU elm trials, tree may be moderately resistant to scale. Prune to develop strong branching structure.

THE MALL EXPERIENCE — THE FUTURE OF DENVER'S 16TH STREET MALL — DESIGN & IMPLEMENTATION

Tree Candidates

Asymmetrical – Red Oak and Similar

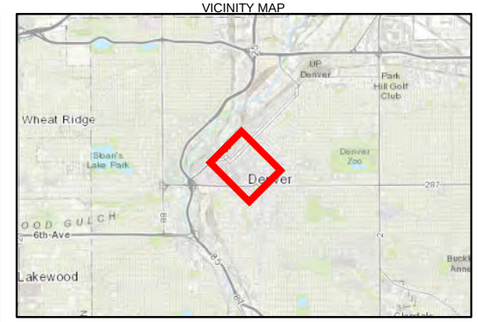
ID	Family	Botanical Name	Acceptable Cultivar	Common Name	Hardiness Zone	Moisture Level	Soil Salt Tolerance	Aerosol Salt Tolerance	Water Quality Area	Height at Maturity	Canopy Spread at Maturity	Growth Form/ Shape	Flowers	Leaf Color – Spring	Leaf Color – Fall	Subject to Change[a]	Additional Notes (includes compaction/tolerances/restrictions)
85	Aceraceae	Acer buergeranum	Streetwise	Trident Maple	5	Min	Tolerant	Intermediate	No	30	30	Oval to rounded	Small green-yellow in spring, insignificant	Dark green	Orange-red	Yes	Slow growing. No pests or disease problems at this time. Snow and ice damage may be a concern.
86	Aceraceae	Acer campestre	–	Hedge Maple	5	Min	Tolerant	Tolerant	No	30	30	Oval to rounded, dense	Small green-yellow in spring, insignificant	Dark green	Yellow	Yes	Tolerates dry soil. Intolerant of soil compaction. Prune to develop strong branching structure and overhead clearance.
3	Aceraceae	Acer miyabei	Morton	State Street Maple	4	Mod	Intermediate	Intermediate	Yes	45	35	Upright pyramidal to rounded	Small green-yellow in spring, insignificant	Green	Yellow-orange	Yes	Cold hardy and drought tolerant, chlorosis resistant; pest free.
101	Hippocastana-ceae	Aesculus x Bergeson	–	Prairie Torch Buckeye	3	Mod	Intermediate	Intermediate	No	27	27	Slightly weeping, globose	Yellow-green in spring, showy	Dark green	Orange-red	No	Excellent cold hardiness. Resistant to leaf scorch. Intolerant of drought.
100	Hippocastana-ceae	Aesculus x 'Homestead'	–	Homestead Buckeye	4	Mod	Intermediate	Unknown	No	35	22	Broad oval to rounded, low branching	Yellow-red flowers in spring, showy	Dark green	Bright red-orange	No	Intolerant of excess heat and drought. Powdery mildew, leaf scorch, and leaf drop may be issues. Prune to develop overhead clearance.
62	Rosaceae	Pyrus calleryana	Glen's Form	Chanticleer Pear	4	Min to Mod	Intermediate	Intermediate	Yes	30	15	Upright pyramidal	White in spring, showy	Glossy green	Red	Yes	Greater fireblight resistance than other cultivars. Overplanting is a concern. Prune to develop strong branching structure
118	Fagaceae	Quercus alba	–	White Oak	3	Mod	Tolerant	Tolerant	No	60	60	Oval to rounded	Insignificant	Green	Copper-orange	Yes	Relatively slow growing. May be intolerant of alkaline soils. Chlorosis may be an issue.
115	Fagaceae	Quercus buckleyi	–	Texas Red Oak	5b	Min	Tolerant	Unknown	No	35	35	Broad rounded	Insignificant	Glossy green	Orange-red	No	Native of Texas is closely related to shumard oak. Tolerant of alkaline soils and drought. Check seed source for hardiness and soil tolerance.
112	Fagaceae	Quercus robur x alba	Tabor PP21382	Forest Knight Oak	4	Xeric to Min	Intermediate	Tolerant	No	45	35	Broad oval	Insignificant	Glossy dark green	Orange-red	No	Columnar hybrid of English and white oak. Tolerant of urban conditions. Kermes scale may be an issue.
121	Fagaceae	Quercus shumardii	–	Shumard Oak	5	Mod	Intermediate	Intermediate	No	60	40	Pyramidal to oval	Insignificant	Green	Orange-red	No	Due to large growth range, source as locally as possible for pH, drought, and hardiness tolerance. Large root system requires large tree lawn. Prune to develop central leader.
96	Fagaceae	Quercus x bimundorum	Midwest	Prairie Stature Oak	3	Min to Mod	Intermediate	Intermediate	No	45	35	Broad pyramidal	Insignificant	Insignificant	Dark green	Yes	Cold hardy hybrid of English and white oak. Tolerant of alkaline soils.
120	Ulmaceae	Ulmus davidiana var. japonica	Burgundy Glow	Northern Empress Japanese Elm	3	Mod	Tolerant	Tolerant	No	28	24	Rounded, open	Insignificant	Green	Red	No	Medium growth rate. Resitant to Dutch elm disease and elm leaf beetle. Resistance to scale unknown. Prune to develop strong branching structure.
4	Ulmaceae	Ulmus parvifolia	Dynasty	Dynasty Elm	5	Mod	Intermediate	Intermediate	Yes	35	35	Vase	Insignificant	Green	Yellow-orange	No	Fast growth rate. Resistance to Dutch elm disease, scale, and elm leaf beetle unknown. Prune to develop strong branching structure. Availability may be limited. Unproven in Denver region.
63	Ulmaceae	Ulmus parvifolia	Emer II PP7552	Allee Lacebark Elm	5	Mod	Intermediate	Intermediate	Yes	45	30	Upright vase with arching limbs	Insignificant	Green	Orange-red	Yes	High resistance to Dutch elm disease and elm leaf beetle. Resistance to scale unknown. Thin, showy bark. Prune to develop strong branching structure.
64	Ulmaceae	Ulmus parvifolia	Corticosa	Cork Bark Elm	6	Mod	Intermediate	Intermediate	Yes	40	40	Vase	Insignificant	Dark green	Orange	No	Resistance to Dutch elm disease, scale, and elm leaf beetle unknown. Prune to develop strong branching structure. Cold hardiness may be an issue. Availability may be limited. Unproven in Denver region.
5	Ulmaceae	Zelkova serrata	Halka	Halka Zelkova	5b	Xeric to Mod	Intermediate	Intermediate	Yes	50	35	Upright vase, open & loose form	Insignificant	Green	Yellow-orange	No	Growth rate is fastest of zelkova cultivars. Tolerant of urban conditions. Susceptible to canker from mechanical injury. Plant in spring. Prune in fall to develop strong branching structure.
65	Ulmaceae	Zelkova serrata	Green Vase	Green Vase Zelkova	5b	Xeric to Mod	Intermediate	Intermediate	Yes	45	30	Vase, upright arching branches	Insignificant	Green	Orange	No	Faster growth rate, but less cold hardy than Village Green. Tolerant of urban conditions. Susceptible to canker from mechanical injury. Plant in spring. Prune in fall to develop strong branching structure.
2	Ulmaceae	Zelkova sinica	–	Chinese Zelkova	5b	Xeric to Mod	Intermediate	Intermediate	Yes	35	35	Vase	Insignificant	Dark green	Yellow-orange	No	Resistant to elm leaf beetle. Exfoliating cinnamon-colored bark. Prune in fall to develop strong branching structure. Availability may be limited. Unproven in Denver region.

[a] Trees are subject to change based on design changes, Department of Forestry recommendations, and availability.

Note: The tree species listed are preliminary candidates for future use on the 16th Street Mall, based on design and health/resiliency criteria. Criteria are subject to change based on design changes, Department of Forestry recommendations, and availability.

Attachment 9
Map Book Project Limits

VICINITY MAP



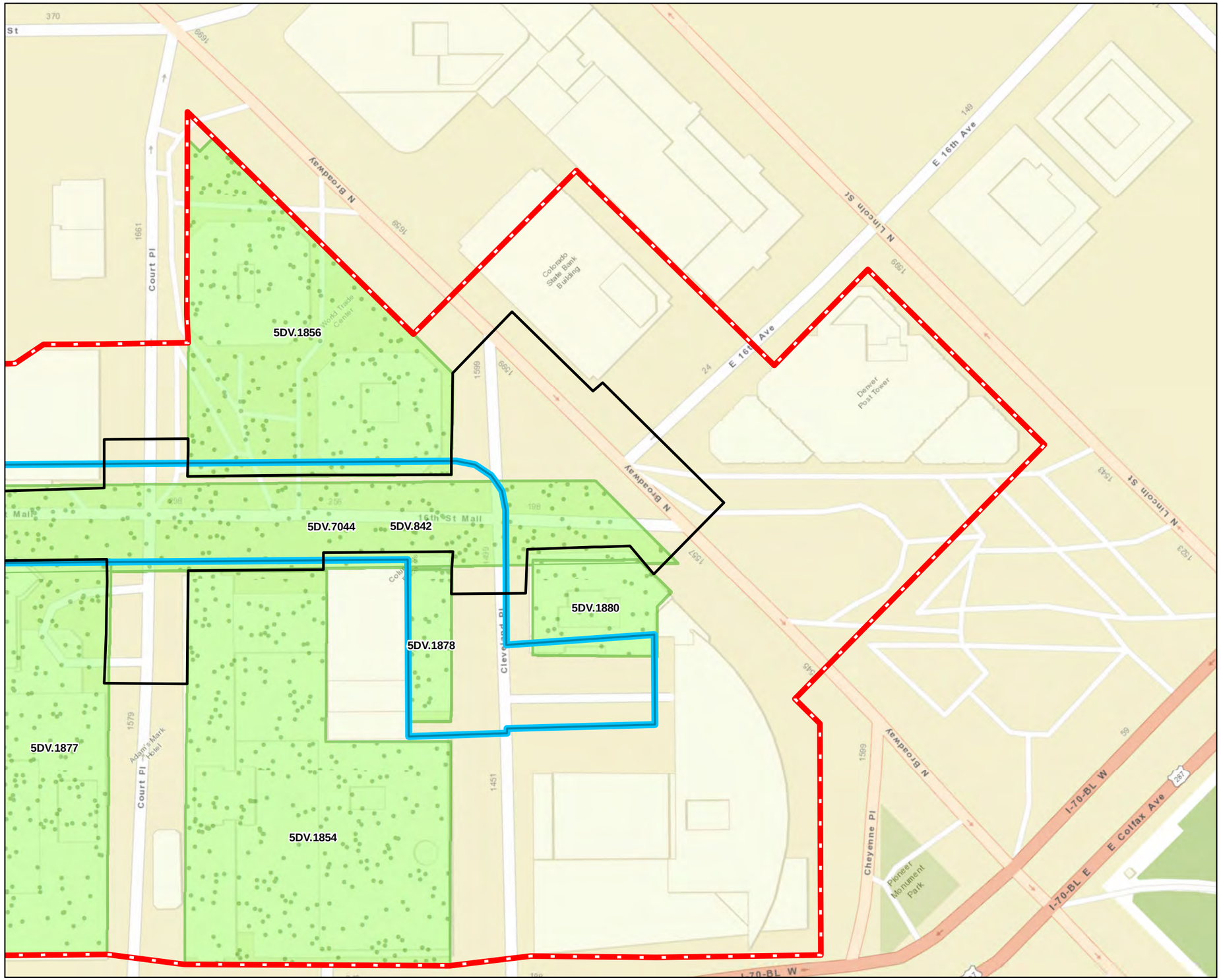
LEGEND

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

0 500 Feet

Overview
Historic Properties and Project Limits
16th Street Mall
March 2018

ch2m



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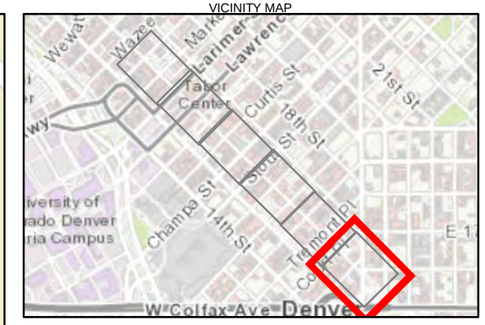


LEGEND

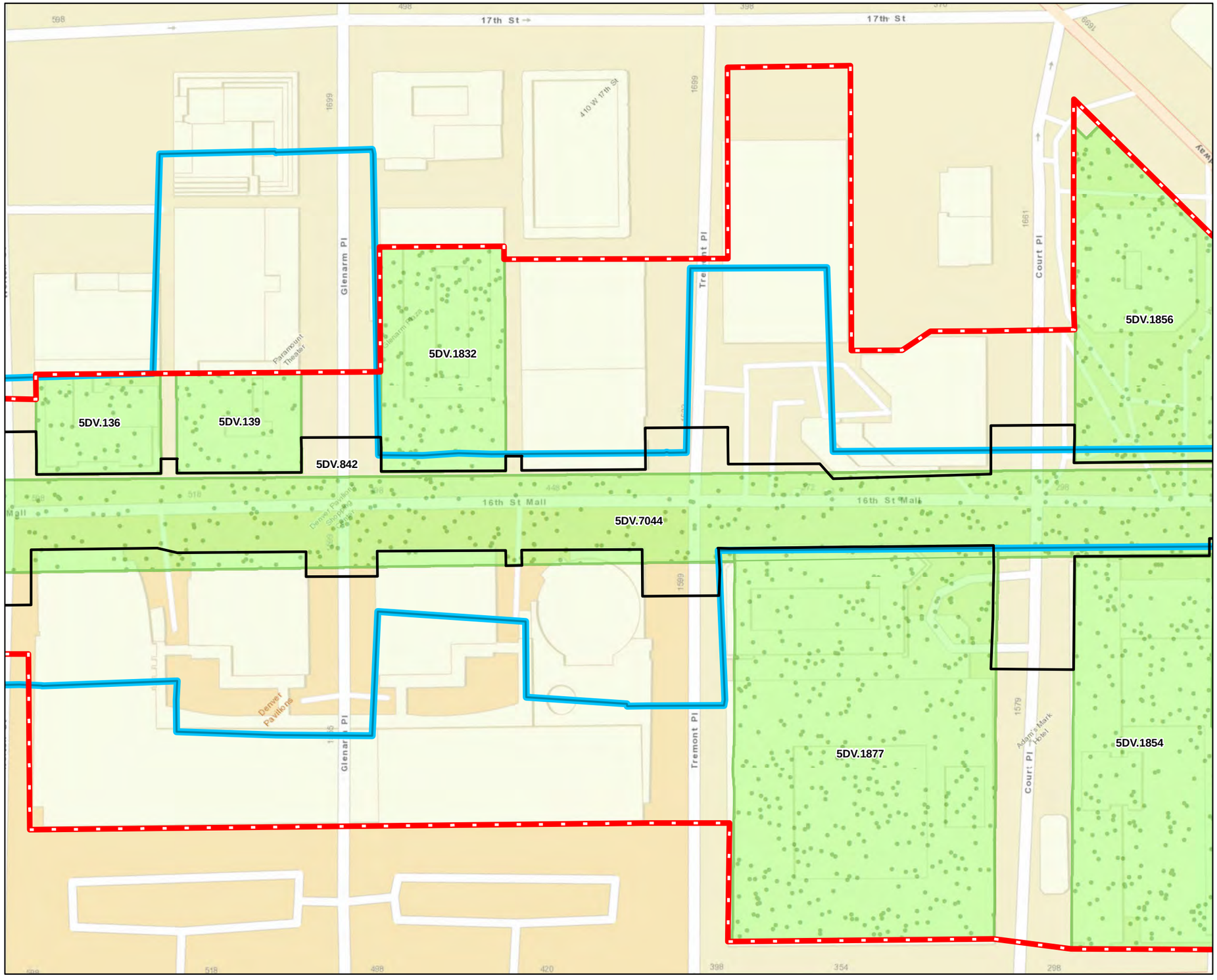
- Area of Potential Effects
- Project Limits
- Historic Properties
- Historic District

N

0 100
Feet

Map Book 1
Historic Properties and Project Limits
16th Street Mall
March 2019

ch2m



VICINITY MAP

LEGEND

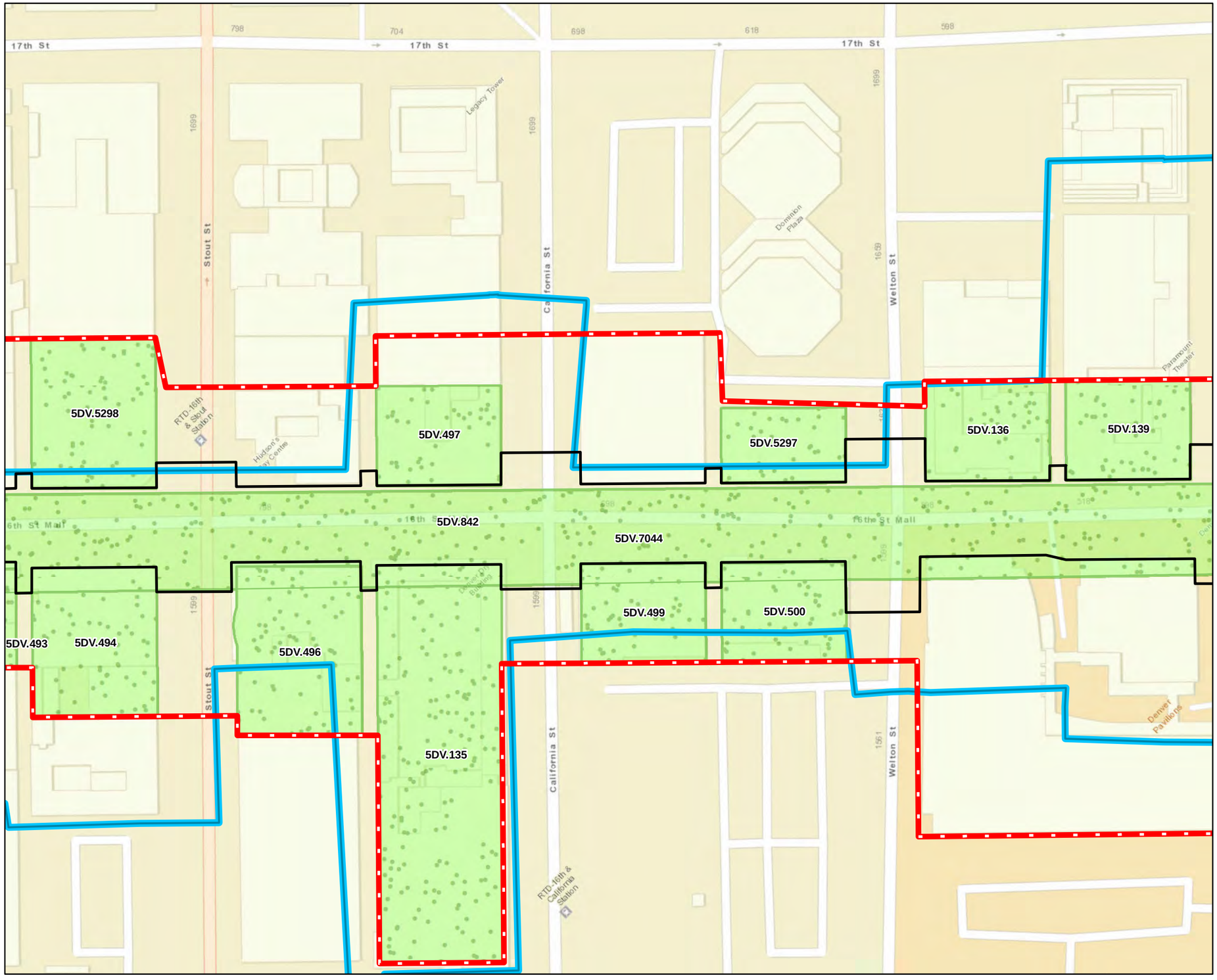
- Area of Potential Effects
- Project Limits
- Historic Properties
- Historic District

N

0 100
Feet

Map Book 2
Historic Properties and Project Limits
16th Street Mall
March 2019

ch2m



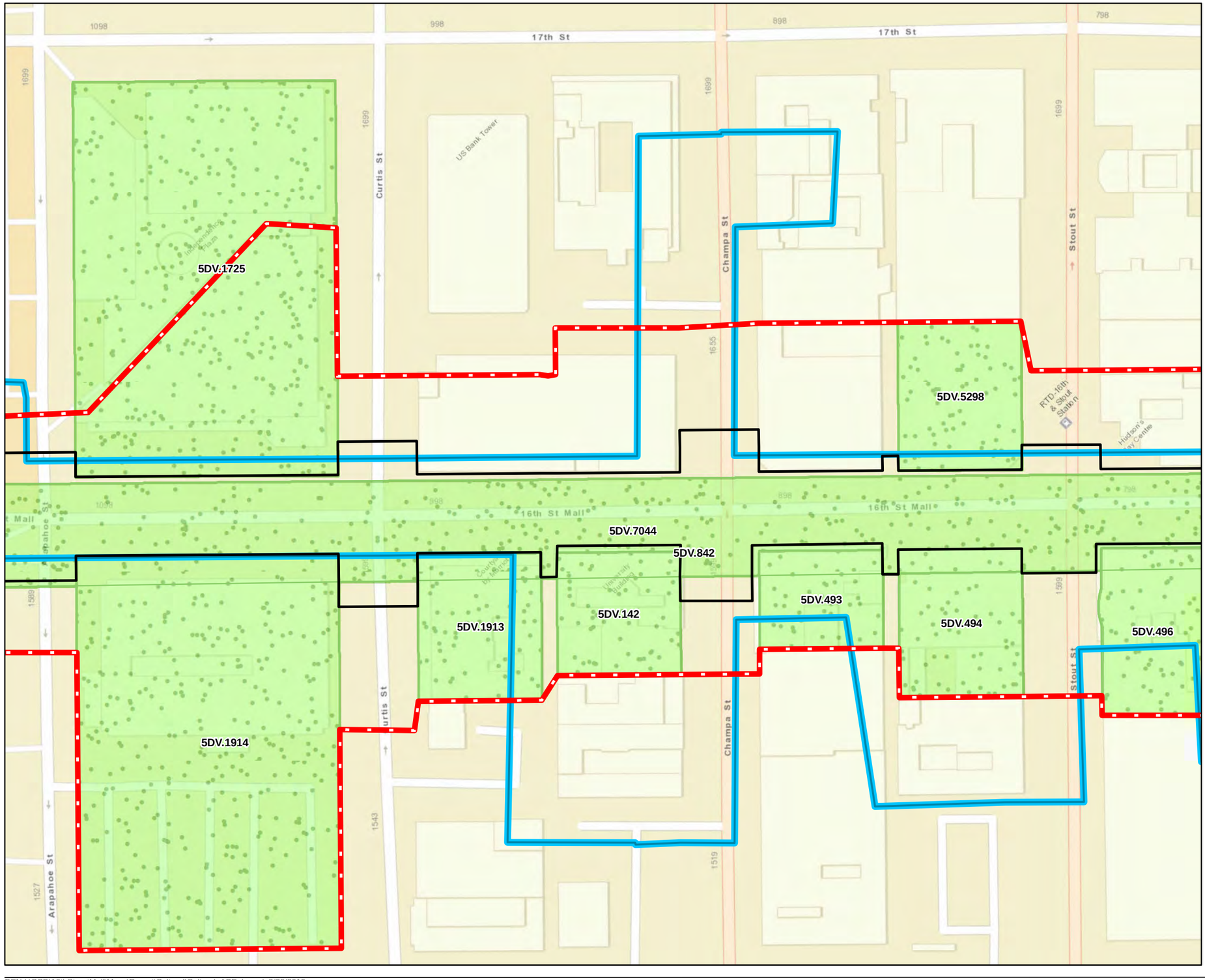
VICINITY MAP

LEGEND

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

0 100
Feet

Map Book 3
Historic Properties and Project Limits
16th Street Mall
March 2019



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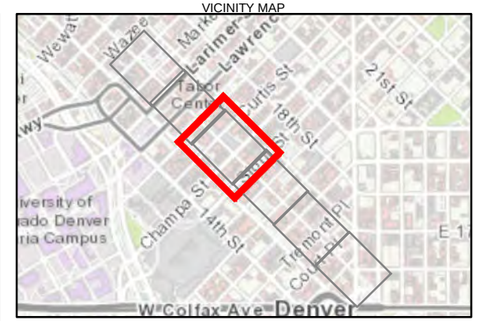


LEGEND

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

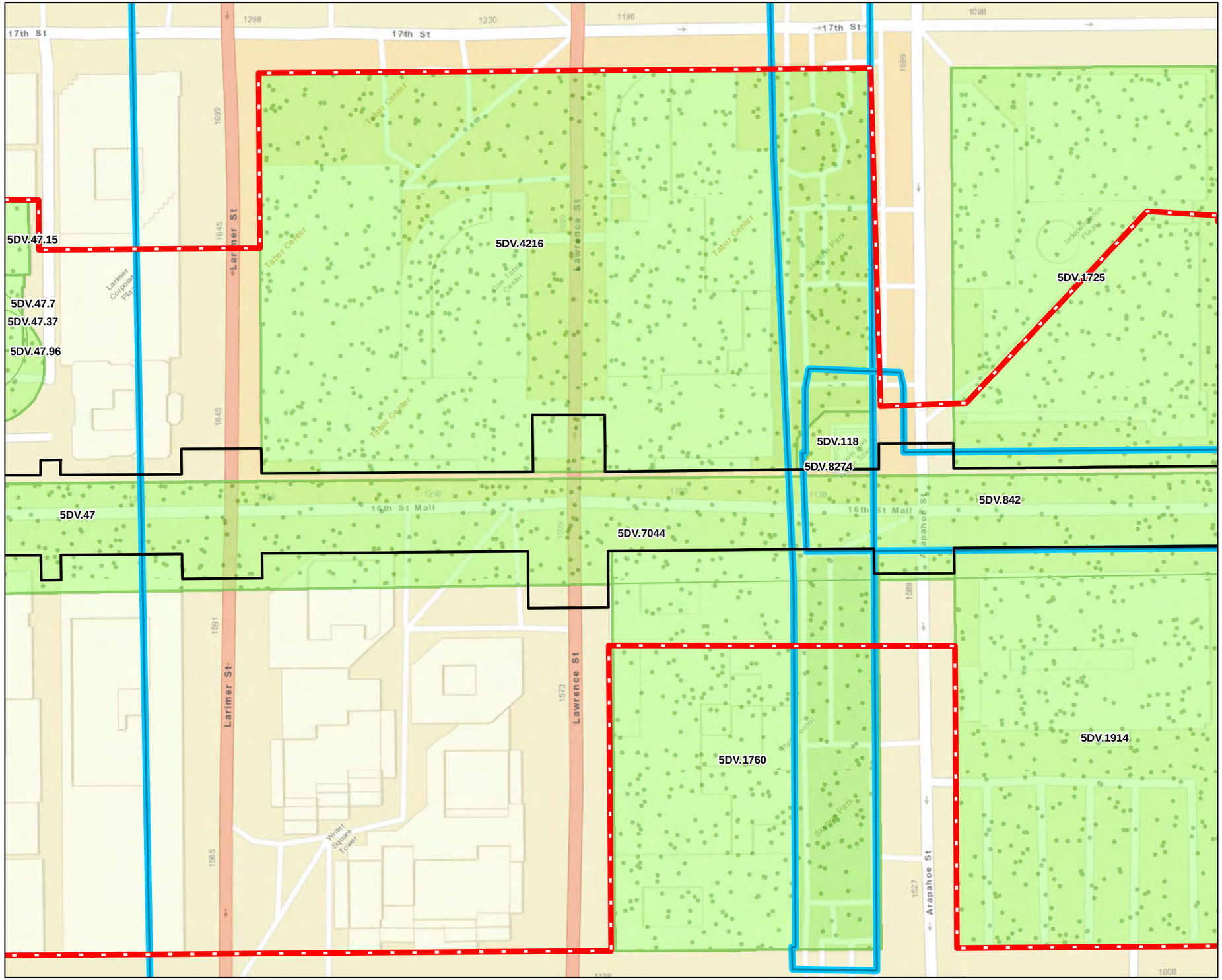
0 100 Feet

Map Book 4
Historic Properties and Project Limits

16th Street Mall

March 2019

ch2m



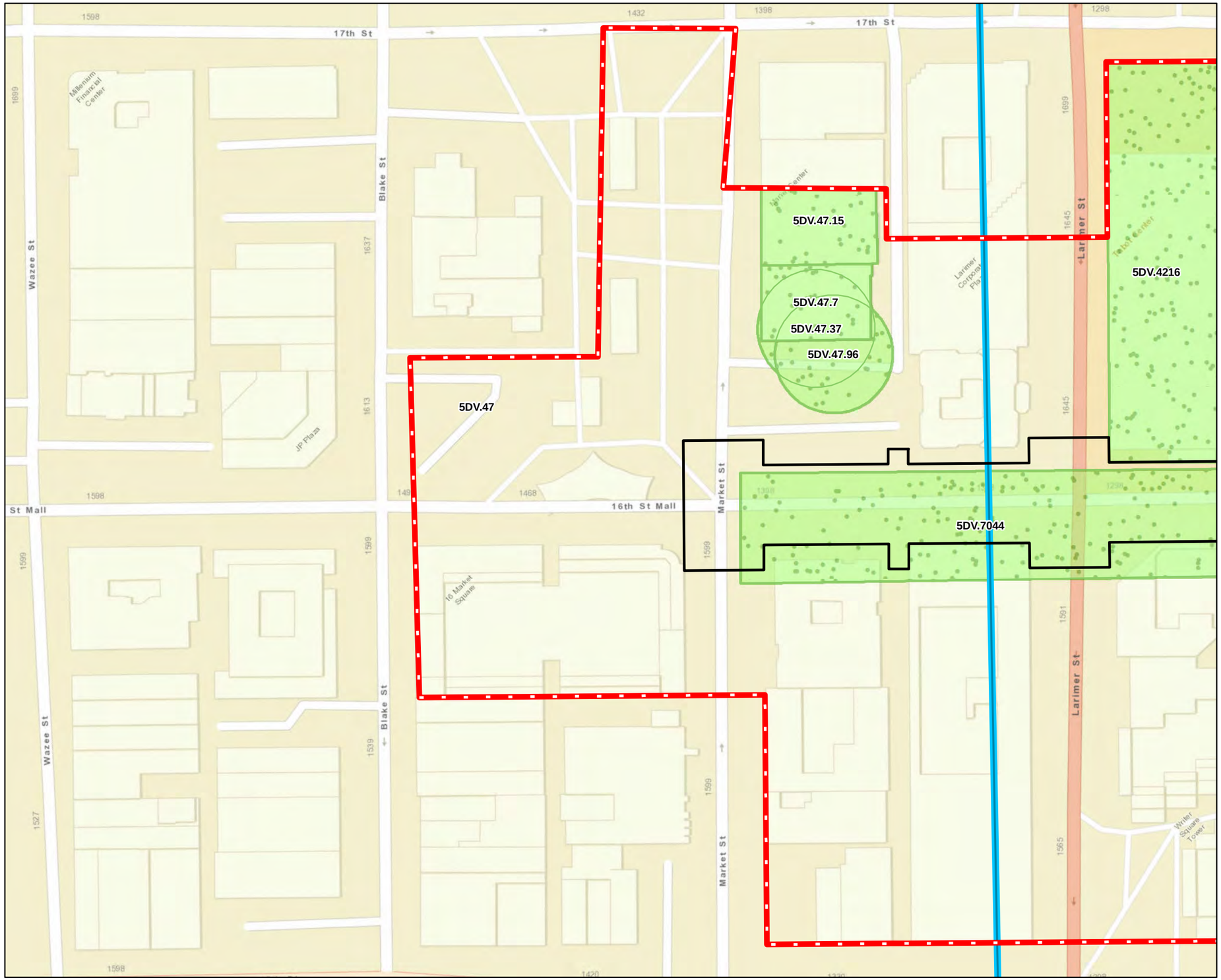
LEGEND

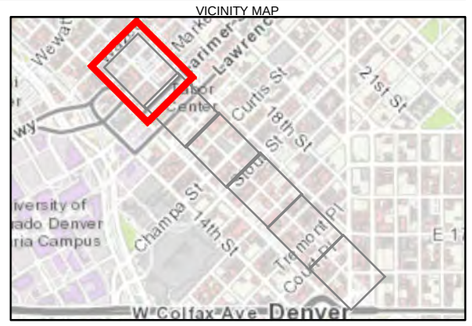
- Area of Potential Effects
- Project Limits
- Historic Properties
- Historic District

N

0 100
Feet

Map Book 5
Historic Properties and Project Limits
16th Street Mall
March 2019





LEGEND

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

0 100 Feet

Map Book 6
Historic Properties and Project Limits
16th Street Mall
March 2019

Appendix B
16th Street Mall Alternatives Analysis Report

TECHNICAL MEMORANDUM

16th Street Mall Alternatives Analysis and Environmental Clearance: Alternatives Analysis Report

TO:	Regional Transportation District
FROM:	CH2M HILL Engineers, Inc.
DATE:	February 2019

1. Project Background

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

2. Purpose of this Report

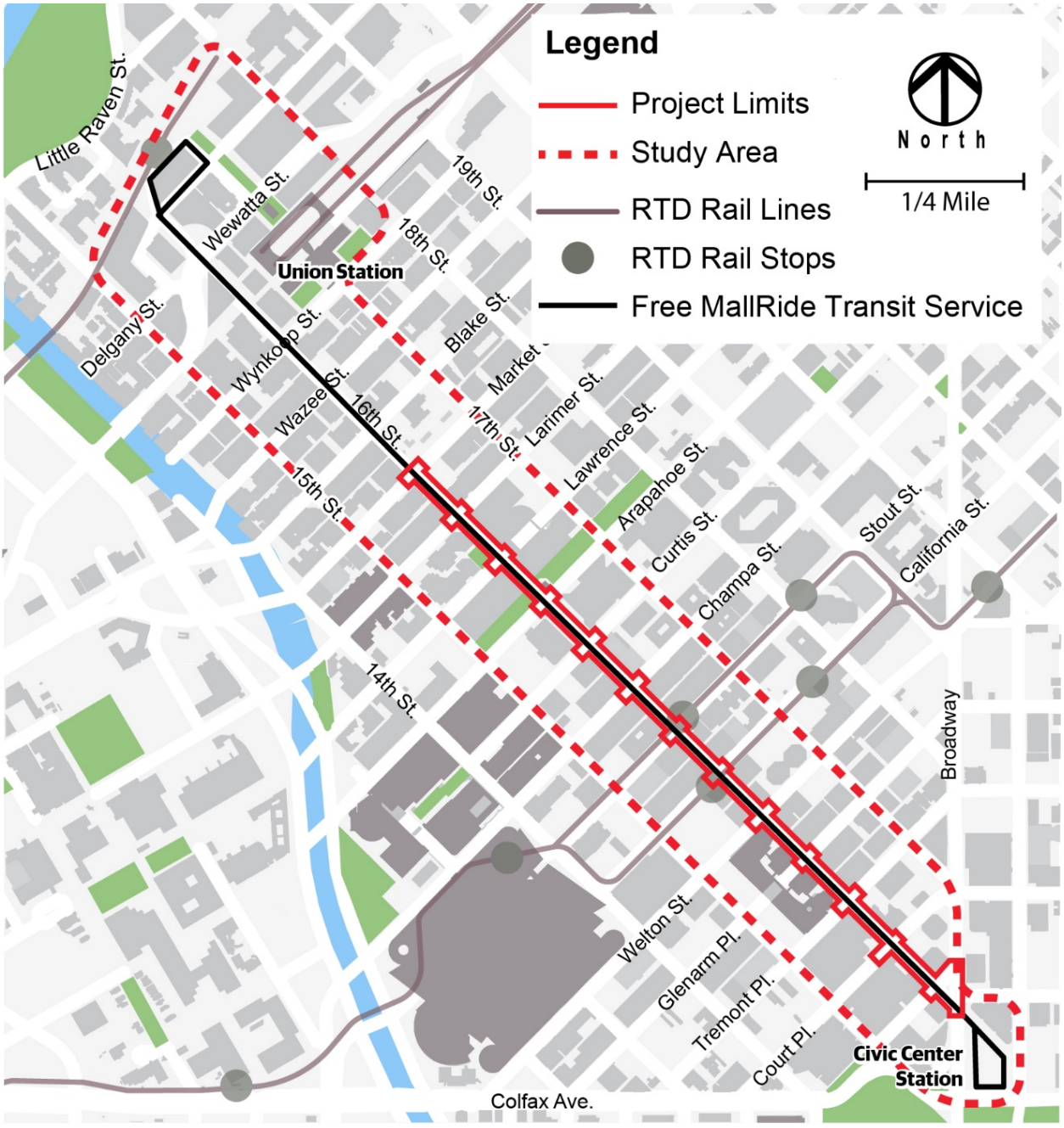
The purpose of this report is to document the development and evaluation of the range of alternatives considered for the Mall and identify a Locally Preferred Alternative (LPA) to best serve the needs of the study area and stakeholders. This report includes a description of the Project limits, study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

3. Project Limits and Study Area

The Project limits are defined as the full 80-foot width of the Mall, building face to building face between Market Street at the western Project limit and Broadway at the eastern Project limit, and including the portion of cross streets that intersect with the Mall's footprint. These Project limits encompass the portion of the Mall constructed in 1982, which connected RTD's Market Street and Civic Center bus stations. In recent years, the Free MallRide service has been

expanded farther west along 16th Street to the renovated and revitalized Denver Union Station (DUS), a hub that connects free MallRide passengers to light rail, commuter rail, and local and regional bus connections. The study area for the EA extends beyond the Project limits to include the area between DUS on the west, Civic Center Station (CCS) on the east, 15th Street on the south, and 17th Street on the north. **Figure 3-1** shows the boundary of the EA study area as well as the Project limits.

Figure 3-1. Project Limits and Study Area



4. Prior Planning and Past Studies

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

Table 4-1. Summary of Past Studies

Name of Study (Author)	Year	Applicability to Current NEPA Study
The Transitway/Mall: A Transportation Project in the Central Business District of Metropolitan Denver (I.M Pei and Partners, Architects and Planners)	1977	Design concept for the Mall. This concept became the Transitway/Mall Alternative in the 1978 EA.
Denver Central Business District Transitway and Transfer Facilities EA (RTD)	1978	NEPA document detailing alternative selection and environmental impacts for the Transitway/Mall Alternative.
Downtown Multimodal Access Plan (CCD et al.)	2005	Established the Mall shuttle service as the cornerstone of downtown Denver's public transportation system and assumed continued shuttle service as part of the recommendations through 2025.
Denver Downtown Area Plan (CCD et al.)	2007	Comprehensive local planning document that guides downtown development. The plan provides recommendations to strengthen the vitality of the Mall, including enhancing subdistricts, developing a retail strategy, and conducting a study to assess infrastructure and reconstruction of the Mall.
An Advisory Services Panel Report: 16th Street Mall, Denver, Colorado: Building on Success (Urban Land Institute)	2008	As recommended by the *Downtown Area Plan*, an assessment was performed to explore the Mall's audience, recommend retail and nonretail strategies to support the urban environment, evaluate dividing the Mall into subdistricts, advise on infrastructure upgrades, and recommend future land use.

Name of Study (Author)	Year	Applicability to Current NEPA Study
16th Street Technical Assessment and Rehabilitation Study (BID et al.); *16th Street Urban Design Plan: Concept Design Report* (CCD et al.)	2009; 2010	As recommended by the *Downtown Area Plan*, an assessment of the existing physical conditions of the Mall and recommendations for the future. The plan recommended that, based on availability of funding, the proposed action should maintain and renovate the existing asymmetrical and median block configuration; renovate and reconfigure furnishings to support public use, pedestrian circulation, and ADA compliance in pedestrian areas; replant missing trees; upgrade power outlets; renovate or replicate lighting; renovate and repair water features including amenities and irrigation; and construct bulb-outs (curb extensions) at intersections.
16th Street Mall Pilot Repair Project (Atkinson)	2011 (report finished in 2014)	Study to provide feedback on condition of paving system and maintenance records, and conduct pilot project to observe rehabilitation techniques. The study provided operations and maintenance recommendations, such as spreading wheel loads and also using a particular type of mortar to secure pavers that require maintenance.
Categorical Exclusion: 16th Street Mall Transitway Rehabilitation (RTD)	2013	Approved NEPA document for a project to rehabilitate and reconstruct a portion of the Mall from Market to Lawrence Streets, and Court Place to Broadway, using methods tested through the pilot paver program. The project was not constructed because of cost considerations.
Downtown Denver 16th Street Mall: Small Steps Towards Big Change (Gehl)	2014/2015 (report finished in 2016)	Assessment of the existing social conditions of the Mall and recommendations for the future. The study found the spatial configuration and shuttle frequency on median blocks limits public use; pedestrian volumes exceed capacity during peak hours, and pedestrians need more walking space; expanded patios were the most successful generators of (nonwalking) public activity on the Mall, which in turn draws more visitors, creates a greater feeling of safety, and increases retail potential.
Transitway Rehabilitation Study (RTD)	2015	After the 2013 Mall rehabilitation project was not implemented, this 2016 study was started to identify and evaluate surface material alternatives for rehabilitation of the Mall transitway. A preferred alternative was not selected, and the study was stopped. The Section 106 consultation process begun for the Transitway Rehabilitation Study has been reinitiated for the EA.

Note:
ADA = Americans with Disabilities Act of 1990

5. Range of Alternatives Considered

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

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

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

A. No Build Alternative

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

Figure 5-1. Existing Cross-section Design

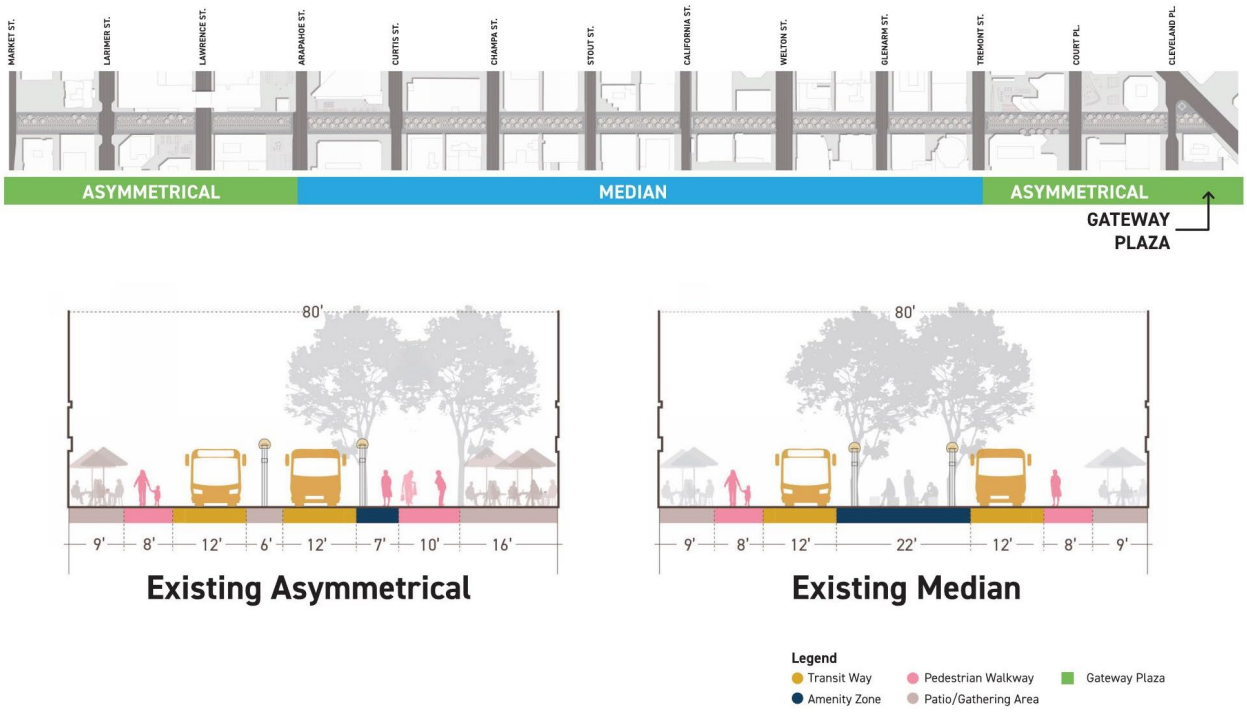
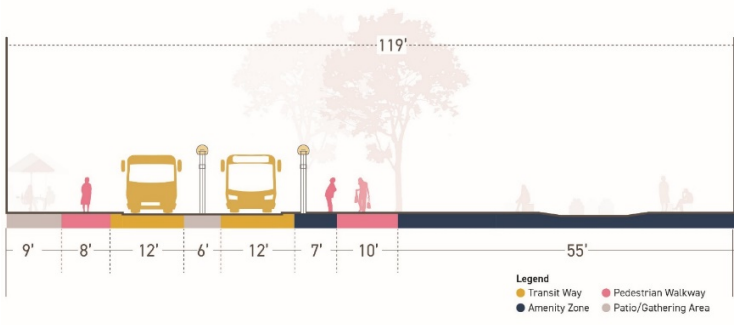


Figure 5-2 is an existing cross section for the Gateway Plaza.

Figure 5-2. Gateway Plaza



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

to be accommodated through continued operation of the Free MallRide on the Mall and the Free MetroRide on 18th and 19th Streets, and continued fare service on bus, light rail, and commuter rail routes.

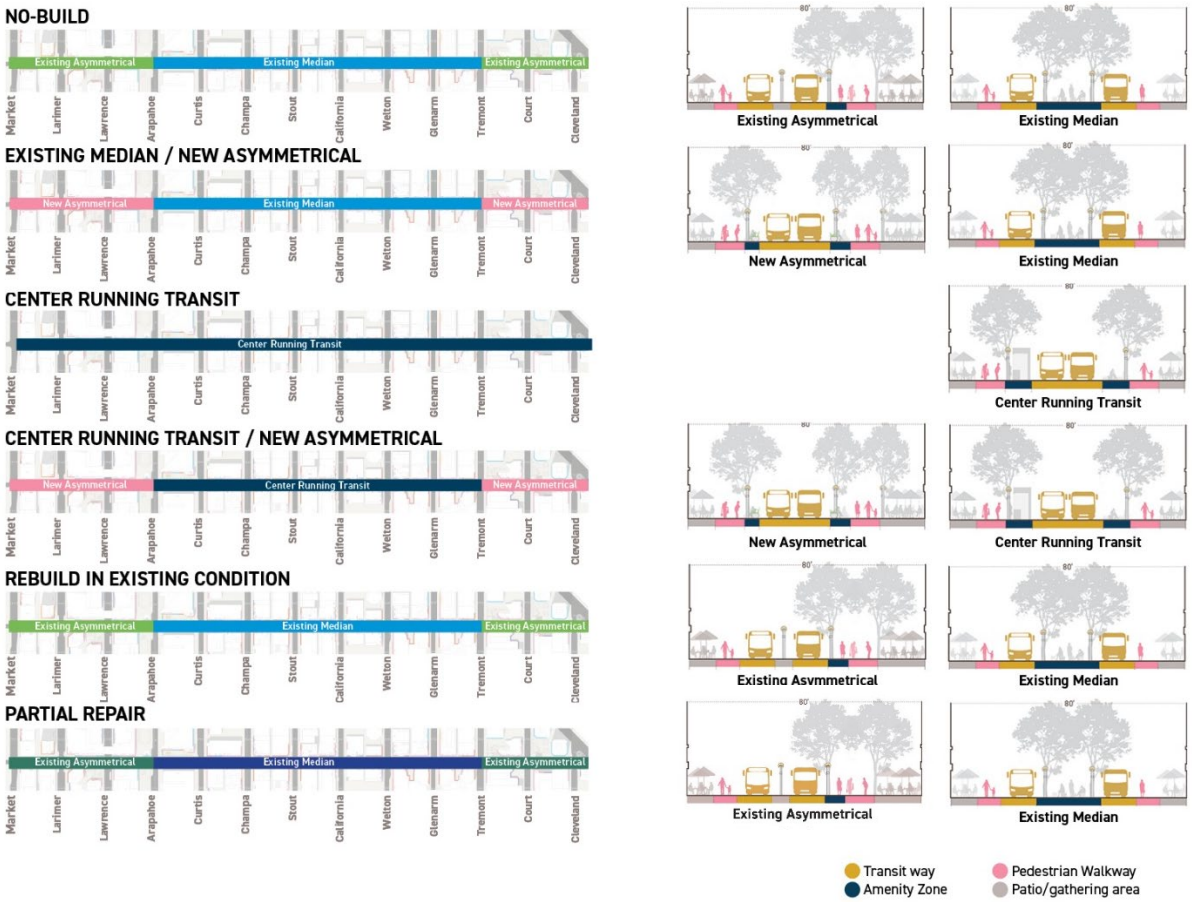
In addition to programmed transit way improvements, the No Build Alternative includes standard maintenance activities (for example, trash pickup, power washing, snow removal, landscaping, and plumbing and electrical maintenance), targeted repairs (for example, granite paver, grout, driveway, and electrical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

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

B. Build Alternatives

The Project Partners developed a range of alternatives based on the Project purpose and need, which includes various design elements. These design elements comprise both physical and operational elements and are summarized in **Table 5-1**. Five build alternatives were developed from these design elements; four of the build alternatives were evaluated in the Level 1 evaluation, and one of the build alternatives—Partial Repair—was added after the Level 1 evaluation (**Figure 5-3**).

Figure 5-3. Range of Alternatives Considered



Note: The Gateway Plaza configuration (**Figure 5-2**) could be implemented between Cleveland Place and Broadway under the Existing Median and New Asymmetrical, Center Running, and Center Running and New Asymmetrical alternatives.

With the exception of the Rebuild in Existing Condition Alternative and Partial Repair Alternative, the spatial configuration of each build alternative was developed using the following design standards:

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

All build alternatives maintain current and planned Free MallRide service levels on the Mall. RTD's service plans and Denver's *Downtown Multimodal Access Plan* (CCD et al., 2005) establish the Free MallRide service as a critical element in Denver's transit system. Moving the Free MallRide service to parallel streets into either mixed traffic or a dedicated transit way would prevent RTD from providing the needed level of transit service and connectivity, and downtown traffic operations would degrade. The Free MetroRide on 19th and 20th Streets is a parallel

service. but cannot replace the Free MallRide because of its operation in mixed traffic and its location.

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

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

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

Problem	Design Elements	Disposition to Carry Forward into Build Alternatives[a]
Failing and Outdated Infrastructure	Not Applicable	Not Applicable
Failing pavement system in constant need of repair	• Continue existing operations and maintenance program	• Carried forward for No Build
	• New pavement mortar	• Carried forward for Alternatives A through E
	• New sub-base	• Carried forward for Alternatives A through E
	• Clean and reset existing pavers	• Carried forward for Alternative E
	• Replace pavement system	• Carried forward for Alternatives A through D
	• Install new granite pavement system	• Carried forward as pavement option for Alternatives A through D
Failing pavement system in constant	• Install different material pavement system with low maintenance requirements	• Carried forward as pavement option for Alternatives A through D

Problem	Design Elements	Disposition to Carry Forward into Build Alternatives[a]
need of repair (continued)	• Replace buses with smaller, lighter buses to reduce loads	• Not carried forward, does not meet operational requirements
Outdated infrastructure (tree boxes, fountains, lack of water quality treatment and modern fiber optic and communications utilities) leads to poor tree health and doesn't meet modern day needs	• New underground tree infrastructure	• Carried forward for Alternatives A through D
	• Replace failing/missing trees in current infrastructure	• Carried forward for Alternative E
	• Construct water quality treatment features	• Carried forward for Alternatives A through D
	• Install modern fiber optic/communications utilities and additional electric power	• Carried forward for Alternatives A through D
	• New/updated fountains	• Carried forward for Alternatives A through E
	• New furnishing reflecting current practices for safety/security	• To be considered during final design
Poor delineation between pedestrian walks and transit causes collisions and near misses	• Retain existing 4-inch curb	• Carried forward for Alternative E; carried forward as a design option for Alternatives A through D
	• Add higher curb between walks and transit	• Carried forward as a design option for Alternatives A through D
	• Shift walks to storefront area	• Carried forward as a design option for Alternatives B and C
	• Add trees, lights, other furnishings between walks and transit	• Carried forward for Alternatives B and C
	• Visually delineate walks and transit with different materials/colors	• Carried forward as a design option for Alternatives A through D
	• Use technology to delineate walks and transit, such as colored lights	• Carried forward as a design option for Alternatives A through D
	• Add barrier/bollards between walks and transit	• Carried forward as a design option for Alternatives A through D
Slick pavement surface causes pedestrian slips and falls, bus traction problems	• Add grooves to granite in transit way	• To be considered during final design
	• Refinish or replace granite with different finish	• Carried forward as pavement option for Alternatives A through D
	• Use different material with higher friction	• Carried forward as pavement option for Alternatives A through D

Problem	Design Elements	Disposition to Carry Forward into Build Alternatives[a]
Higher crash numbers at cross-street intersections adjacent to median blocks (Arapahoe to Tremont)	• Install physical barrier to prevent crossing between medians and consolidate crossing points to sidewalks	• Carried forward as a design option for Alternatives A, D, and E
	• Install signage to prevent crossing between medians and consolidate crossing points to sidewalks	• Carried forward as a design option for Alternatives A, D, and E
	• Eliminate median and consolidate crossing points to sidewalks	• Carried forward for Alternatives B and C
	• Construct bulb-outs at intersections to reduce cross street width	• Carried forward for Alternatives A through E
Maintain Mall transit operations	• Accommodate bidirectional transit operations to 2035 and beyond	• Carried forward for all alternatives
	• Provide 12-foot-wide bus lanes	• Carried forward for all alternatives
	• Use parallel, center-running lanes to simplify bus operations	• Carried forward for Alternative B
	• Maintain space for two back-to-back buses at each shuttle stop to accommodate increased service needs	• Carried forward for all alternatives
	• Maintain service levels and shift new ridership to Free MetroRide	• Not carried forward, Free MetroRide service is slower than Free MallRide and cannot meet additional Mall ridership demand
Frequent maintenance disrupts transit operations, and would be more disruptive as ridership grows	• New pavement mortar	• Carried Forward for Alternatives A through E
	• New sub-base	• Carried forward for Alternatives A through E
	• Replace pavement system	• Carried forward for Alternatives A through E
	• Install new granite pavement system	• Carried forward as pavement option for Alternatives A through D
	• Install different material pavement system with low maintenance requirements	• Carried forward as pavement option for Alternatives A through D

Problem	Design Elements	Disposition to Carry Forward into Build Alternatives[a]
	• Build third transit way to maintain operations during maintenance	• Not carried forward, will not meet program needs for flexibility
Sidewalks are too small for pedestrian volumes[b] and CCD standards[c] (10-foot sidewalks downtown)	• Widen sidewalks by removing or narrowing patio and gathering areas	• Carried forward for Alternatives A, D, and E; does not meet requirements for patio size[d]
	• Widen sidewalks by moving transit ways	• Carried forward for Alternatives A through C
	• Widen sidewalks by narrowing transit ways	• Not carried forward, does not meet bus operation requirements
Physical separation of median from primary pedestrian walks, along with limited median size and frequent shuttle service on both sides of the median, results in low public use and surveillance, increased negative social behaviors (for example, panhandling[e]), and decreased sense of safety[f].	• Increase size of medians	• Not carried forward, does not provide adequate sidewalk and patio space next to buildings
	• Decrease transit service frequency and shift ridership to Free MetroRide	• Not carried forward, Free MetroRide service is slower than Free MallRide and cannot meet additional Mall ridership demand
	• Remove/reduce medians where possible and consolidate space against buildings	• Carried forward for Alternatives B and C
Limited usability of narrow sides of asymmetrical blocks to accommodate patio/gathering space and pedestrian needs.	• Widen sidewalks by moving transit ways	• Carried forward for Alternatives A through C
	• Widen sidewalks by narrowing transit ways	• Not carried forward, does not meet bus operation requirements
Less than 1 percent of Mall users stop to spend time on the Mall	• Install closed-circuit television (CCTV) and/or other surveillance measures to increase security	• Applicable to Alternatives A through D
	• Maintain/improve security[g] and police presence	• Applicable to all alternatives; current police budget does not allow dedicated officers to Mall
	• Provide more active programming of Mall	• Applicable to all alternatives

Problem	Design Elements	Disposition to Carry Forward into Build Alternatives[a]
	• Install more seating, furniture, interactive installations on blocks without it	• To be considered during final design
	• Redirect pedestrians to storefront areas	• Carried forward for Alternatives B and C

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

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

[c] CCD. 1993. Streetscape Design Manual.

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

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

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

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

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

1. Median and New Asymmetrical Alternative

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

a) Cross-section Design

This alternative uses two primary cross-section designs. The cross-section designs and extent of each cross-section design on the Mall are illustrated on **Figure 5-3**. The median cross-section design would be the same as the existing median cross-section design. The new asymmetrical

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

b) Infrastructure

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

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

c) Intersection Design

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

d) Materials and Pattern

This alternative could be implemented with any of the five pavement options studied:

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

e) Bus Operations

This alternative would allow for continued Free MallRide service on the Mall in the same manner that it exists today and would not preclude operational changes in transit service along the Mall.

f) Safety and Security

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

- Median cross-section design: This cross-section design would maintain the existing median block cross-section design, which restricts natural surveillance, territoriality, and the ability to manage pedestrian use for the entire width of the Mall because the transit ways and buses provide a real and perceived barrier.
- New asymmetrical cross-section design: This cross-section design promotes natural surveillance, territoriality, and provides the ability to manage pedestrian use for the entire width of the Mall because no real or perceived barriers exist.

2. Center Running Alternative

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

a) Cross-section Design

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

b) Infrastructure

Refer to description under Median and New Asymmetrical Alternative.

c) Intersection Design

Refer to description under Median and New Asymmetrical Alternative.

d) Materials and Pattern

Refer to description under Median and New Asymmetrical Alternative.

e) Bus Operations

Refer to description under Median and New Asymmetrical Alternative.

f) Safety and Security

Treatments or design elements to delineate the transit way from pedestrian walking areas will be decided during subsequent design phases and could be implemented with any of the pavement types listed in in this technical memorandum This alternative would also allow for

continued implementation of DDP's Downtown Security Action Plan. **Section 7** of this technical memorandum describes CPTED principles included in the Project description. The center-running cross-section design would remove the existing median block cross-section design and utilize CPTED principles. By removing the median blocks and relocating that space outside of the transit way, the design promotes natural surveillance and territoriality, and increases the ability to manage pedestrian use for the entire width of the Mall because no real or perceived barriers exist.

3. Center Running and New Asymmetrical Alternative

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

a) Cross-section Design

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

b) Infrastructure

Refer to description under Median and New Asymmetrical Alternative.

c) Intersection Design

Refer to description under Median and New Asymmetrical Alternative.

d) Materials and Pattern

Refer to description under Median and New Asymmetrical Alternative.

e) Bus Operations

Refer to description under Median and New Asymmetrical Alternative.

f) Safety and Security

Refer to description under Center Running Alternative.

4. Rebuild in Existing Configuration

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

a) Cross-section Design

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

b) Infrastructure

Refer to description under Median and New Asymmetrical Alternative.

c) Intersection Design

Refer to description under Median and New Asymmetrical Alternative.

d) Materials and Pattern

Refer to description under Median and New Asymmetrical Alternative.

e) Bus Operations

Refer to description under Median and New Asymmetrical Alternative.

f) Safety and Security

Refer to description under Median and New Asymmetrical Alternative.

5. Partial Repair

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

a) Cross-section Design

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

b) Infrastructure

This alternative replaces the following infrastructure:

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

c) Intersection Design

Refer to description under Median and New Asymmetrical Alternative.

d) Materials and Pattern

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

e) Bus Operations

Refer to description under Median and New Asymmetrical Alternative.

f) Safety and Security

Refer to description under Median and New Asymmetrical Alternative.

6. Evaluation Process and Results

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

A. Level 1 Evaluation

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

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

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

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

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

- Bike lanes were not included in the build alternatives for two reasons: RTD operates the transit way as a fixed guideway supported by federal funding, and federal regulations prevent the operation of other transportation modes in a fixed guideway; and CCD has planned and implemented a downtown bicycle network that recognizes the Mall as a dedicated transit way and has bicycle lanes on parallel streets.
- Moving transit off the Mall would have ripple effects through the downtown and regional transit system, as well as the downtown roadway traffic system. **Section 5** in this technical memorandum provides additional discussion as to why moving transit off of the Mall was not carried forward as an alternative.

- A new alternative, named the Partial Repair Alternative (described in **Section 5**), was added to the range of alternatives for study in the Level 2 evaluation.

All four build alternatives and the new Partial Repair Alternative were carried forward to the Level 2 evaluation to analyze costs, safety data, and other criteria.

Table 6-1. Level 1 Alternatives Evaluation

Category	Evaluation Criteria	No Build	Median and New Asymmetrical	Center Running	Center Running and New Asymmetrical	Rebuild in Existing Configuration
Infrastructure	Replacement of failing and outdated infrastructure	No replacement of failing and outdated infrastructure. *Does not meet Purpose and Need: does not replace failing and outdated infrastructure.*	Full replacement of failing and outdated infrastructure (for example, pavement system, tree boxes, fountains) and potential addition of needed utilities (fiber, communications, electric). Potential ability to maintain infrastructure with reasonable remaining service life.	Full replacement of failing and outdated infrastructure (for example, pavement system, tree boxes, fountains) and potential addition of needed utilities (fiber, communications, electric). Potential ability to maintain infrastructure with reasonable remaining service life.	Full replacement of failing and outdated infrastructure (for example, pavement system, tree boxes, fountains) and potential addition of needed utilities (fiber, communications, electric). Potential ability to maintain infrastructure with reasonable remaining service life.	Full replacement of failing and outdated infrastructure (for example, pavement system, tree boxes, fountains) and potential addition of needed utilities (fiber, communications, electric). Potential ability to maintain infrastructure with reasonable remaining service life.
	Effect of tree location on tree health	No change to tree location. Trees remain close to transit way and can be damaged by vehicles. Trees remain adequate distance from buildings and other trees.	On asymmetrical blocks, tree location is away from transit way (minimizing vehicle damage) and adequate distance from buildings and other trees. Tree location can be optimized to provide shade and use current best management practices for underground structure for health. On median blocks, trees remain close to transit way, to maintain adequate distance from other trees, resulting in potential damage by vehicles.	Tree location is away from transit way (minimizing vehicle damage) and adequate distance from buildings and other trees. Tree location can be optimized to provide shade and use current best management practices for underground structure for health.	Tree location is away from transit way (minimizing vehicle damage) and adequate distance from buildings and other trees. Tree location can be optimized to provide shade and use current best management practices for underground structure for health.	On asymmetrical blocks, tree location is away from transit way (minimizing vehicle damage) and adequate distance from buildings and other trees. On median blocks, trees remain close to transit way, resulting in potential damage by vehicles.

Category	Evaluation Criteria	No Build	Median and New Asymmetrical	Center Running	Center Running and New Asymmetrical	Rebuild in Existing Configuration
Safety	Separation/delineation of transit and pedestrians	Constrained pedestrian walking areas (less than 10 feet of clear pedestrian space) remain immediately adjacent to transit ways on median blocks and narrow sides of asymmetrical blocks. *Does not meet Purpose and Need: does not address safety of pedestrians and transit.*	Tree location separates pedestrian walking areas from transit ways on wider sides of asymmetrical blocks. Pedestrian walking areas on narrow sides of asymmetrical blocks remain immediately adjacent to transit ways, but are wider than in No Build and provide 10 feet of clear pedestrian space to accommodate pedestrian volumes. Constrained pedestrian walking areas (less than 10 feet of clear pedestrian space) remain immediately adjacent to transit ways on median blocks. *Does not meet Purpose and Need: does not address safety of pedestrians and transit on median blocks.*	Tree location separates pedestrian walking areas from transit ways on both sides of block.	Tree location separates pedestrian walking areas from transit ways on center-running blocks and on wider sides of asymmetrical blocks. Pedestrian walking areas on narrow sides of asymmetrical blocks remain immediately adjacent to transit ways, but are wider than in No Build and provide 10 feet of clear pedestrian space to accommodate pedestrian volumes.	Tree location separates pedestrian walking areas from transit ways on wider sides of asymmetrical blocks. Constrained pedestrian walking areas (less than 10 feet of clear pedestrian space) remain immediately adjacent to transit ways on both sides of median blocks and narrow sides of asymmetrical blocks. *Does not meet Purpose and Need: does not address safety of pedestrians and transit.*
	Pedestrian/vehicle conflicts	Four conflict points on median blocks. Pedestrians cross single-width one-way transit way. Four conflict points on asymmetrical blocks. Pedestrians cross one-way transit ways with small refuge area in between.	Four conflict points on median blocks. Pedestrians cross single-width one-way transit way. Two conflict points on asymmetrical blocks. Pedestrians cross double-width two-way transit ways.	Two conflict points; pedestrians cross double-width two-way transit ways.	Two conflict points; pedestrians cross double-width two-way transit ways.	Four conflict points on median blocks. Pedestrians cross single-width one-way transit way. Four conflict points on asymmetrical blocks. Pedestrians cross one-way transit ways with small refuge area in between.
	Incorporation of RTD safety criteria, including incorporation of CPTED[a], lighting, and receptacle design.	Does not meet some RTD safety criteria, such as lighting and receptacle design.	Ability to meet RTD safety criteria.	Ability to meet RTD safety criteria.	Ability to meet RTD safety criteria.	Ability to meet RTD safety criteria.

Category	Evaluation Criteria	No Build	Median and New Asymmetrical	Center Running	Center Running and New Asymmetrical	Rebuild in Existing Configuration
Mobility	Clear space for reliable two-way transit operations	Transit-lane width meets current design requirements.	Transit-lane width meets current design requirements.	Transit-lane width meets current design requirements.	Transit-lane width meets current design requirements.	Transit-lane width meets current design requirements.
	Accommodation of pedestrian volumes[b]	Pedestrian areas on outer edges of median blocks, and narrow sides of asymmetrical blocks, do not provide 10 feet of clear pedestrian space when 9 feet of patio space is provided. *Does not meet Purpose and Need: does not accommodate pedestrian volumes and adequate gathering/patio space.*	Pedestrian areas on outer edges of median blocks do not provide 10 feet of clear pedestrian space when 9 feet of patio space is provided. Both sides of asymmetrical blocks provide at least 10 feet of clear pedestrian space when 9 feet patio space is provided, if narrow sides of blocks are a minimum 19 feet wide. *Does not meet Purpose and Need: does not accommodate pedestrian volumes and adequate gathering/patio space on median blocks.*	Both sides of block can provide 10 feet of clear pedestrian space with a variety of adjacent gathering opportunities.	Both sides of median block can provide 10 feet of clear pedestrian space with a variety of adjacent gathering opportunities. Both sides of asymmetrical blocks provide at least 10 feet of clear pedestrian space when 9 feet of patio space is provided, if narrow sides of blocks are a minimum 19 feet wide.	Pedestrian areas on outer sides of median blocks and narrow side of asymmetrical blocks do not provide 10 feet of clear pedestrian space when 9 feet of patio space is provided. Wide side of asymmetrical block can provide 10 feet of clear pedestrian space with a variety of adjacent gathering opportunities *Does not meet Purpose and Need: does not accommodate pedestrian volumes and adequate gathering/patio space.*
	Ease of transit shuttle operations: number of shifts shuttles make from block to block	Two shifts over length of Mall	Two shifts over length of Mall	No shifts	Two shifts over length of Mall	Two shifts over length of Mall
	Ability to adhere to ADA accessibility requirements	Mall does not fully adhere to ADA requirements. Median block promenades have physical obstructions to ADA accessibility.	Ability to adhere to ADA requirements.	Ability to adhere to ADA requirements.	Ability to adhere to ADA requirements.	Ability to adhere to ADA requirements.

Category	Evaluation Criteria	No Build	Median and New Asymmetrical	Center Running	Center Running and New Asymmetrical	Rebuild in Existing Configuration
Public Use	Space for both pedestrian use and gathering opportunities for leisure, commerce, and tourism	Outer sides of median blocks and narrow sides of asymmetrical blocks provide limited gathering space and configurations when pedestrian use is accommodated with 10 feet of clear pedestrian circulation. Medians are underutilized because transit ways physically separate median from pedestrian walking areas and because space constraints limit gathering opportunities along with pedestrian access between trees in the medians. Wide sides of asymmetrical blocks allow for a variety of configurations of gathering opportunities, including patios, and 10 feet of clear pedestrian circulation. *Does not meet Purpose and Need: does not provide adequate gathering and patio space and accommodate pedestrian volumes*.	Outer sides of median blocks and narrow sides of asymmetrical blocks provide limited gathering space and configurations when pedestrian use is accommodated with 10 feet of clear pedestrian circulation. Medians are underutilized because transit ways physically separate median from pedestrian walking areas and because space constraints limit gathering opportunities along with pedestrian access between trees in the medians. Narrow sides of asymmetrical blocks do not have room for trees. Wide sides of asymmetrical blocks allow for a variety of configurations of gathering opportunities, including patios, and 10 feet of clear pedestrian circulation. *Does not meet Purpose and Need: does not provide adequate gathering and patio space and accommodate pedestrian volumes on median blocks*.	Provides 28 feet of usable public space on both sides of blocks to allow for a variety of configurations of gathering opportunities, including patios, and 10 feet of clear pedestrian circulation. Offers opportunity for trees along both sides of blocks.	Center-running blocks provide 28 feet of usable public space on both sides of blocks to allow for a variety of configurations of gathering opportunities, including patios, along with 10 feet of clear pedestrian circulation. Narrow sides of asymmetrical blocks provide limited gathering space and configurations when pedestrian use is accommodated with 10 feet of clear pedestrian space. Narrow sides of asymmetrical blocks do not have room for trees. Wide sides of asymmetrical blocks allow for a variety of configurations of gathering opportunities, including patios, and 10 feet of clear pedestrian circulation.	Outer sides of median blocks and narrow sides of asymmetrical blocks provide limited gathering space and configurations when pedestrian use is accommodated with 10 feet of clear pedestrian circulation. Medians are underutilized because transit ways physically separate median from pedestrian walking areas and because space constraints limit gathering opportunities along with pedestrian access between trees in the medians. Narrow sides of asymmetrical blocks do not have room for trees. Wide sides of asymmetrical blocks allow for a variety of configurations of gathering opportunities, including patios, and 10 feet of clear pedestrian circulation. *Does not meet Purpose and Need: does not provide adequate gathering and patio space and accommodate pedestrian volumes*.

Category	Evaluation Criteria	No Build	Median and New Asymmetrical	Center Running	Center Running and New Asymmetrical	Rebuild in Existing Configuration
Public Use (continued)	Long-term adaptability: ability to allow for spatial reconfiguration for events or other changes, such as building use, over the next 40 years.	Asymmetrical blocks provide consolidated spaces to allow for future changes in space allocation. Ability for spatial reconfiguration is limited in median blocks as a result of space constraints for gathering opportunities along with pedestrian access between trees in the medians. Ability to reconfigure restaurant patios away from buildings and maintain 10 feet of clear pedestrian space along wide side of five asymmetrical blocks. Restaurant patios in medians infeasible because of the need to cross transit ways for service. Lack of modern communications technology infrastructure.	Asymmetrical blocks provide consolidated spaces to allow for future changes in space allocation. Ability for spatial reconfiguration is limited in median blocks as a result of space constraints for gathering opportunities along with pedestrian access between trees in the medians. Ability to reconfigure restaurant patios away from buildings and maintain 10 feet of clear pedestrian space along wide side of asymmetrical blocks. Restaurant patios in medians infeasible because of the need to cross transit ways for service. Ability to incorporate innovative technology and infrastructure to easily adapt to future changes in building use, Mall operations, bus technology and operations, and user expectations.	All blocks provide consolidated spaces to allow for future changes in space allocation. Ability to reconfigure restaurant patios away from buildings and maintain 10 feet of clear pedestrian space along both sides of all blocks. Ability to incorporate innovative technology and infrastructure to easily adapt to future changes in building use, Mall operations, bus technology and operations, and user expectations.	All blocks provide consolidated spaces to allow for future changes in space allocation. Ability to reconfigure restaurant patios away from buildings and maintain 10 feet of clear pedestrian space along both sides of center-running blocks and one side on five asymmetrical blocks. Ability to incorporate innovative technology and infrastructure to easily adapt to future changes in building use, Mall operations, bus technology and operations, and user expectations.	Asymmetrical blocks provide consolidated spaces to allow for future changes in space allocation. Ability for spatial reconfiguration is limited in median blocks as a result of space constraints for gathering opportunities along with pedestrian access between trees in the medians. Ability to reconfigure restaurant patios away from buildings and maintain 10 feet of clear pedestrian space along wide side of asymmetrical blocks. Restaurant patios in medians infeasible because of the need to cross transit ways for service. Ability to incorporate innovative technology and infrastructure to easily adapt to future changes in building use, Mall operations, bus technology and operations, and user expectations.
	Short-term flexibility for gathering opportunities and programming variety.	Requires removal of buses from Mall to reconfigure space on a larger scale on median blocks. No fiber, communications, or widespread electrical utilities.	Requires removal of buses from Mall to reconfigure space on a larger scale on median blocks. Consolidated spaces on asymmetrical blocks provide contiguous space for public use and activities, and changes in amenities and types of use. Opportunity to add utilities (fiber, communications, electric) to allow for changes in amenities and types of use.	Consolidates public gathering space from three areas to two, to provide more contiguous space for public use and activities, and changes in amenities and types of use. Opportunity to combine public use and activities within tree canopy area, maximizing public gathering space. Opportunity to add utilities (fiber, communications, electric) to allow for changes in amenities and types of use.	Consolidates public gathering space from three areas to two, to provide more contiguous space for public use and activities, and changes in amenities and types of use. Opportunity to add utilities (fiber, communications, electric) to allow for changes in amenities and types of use.	Requires removal of buses from Mall to reconfigure space on a larger scale on median blocks. Consolidated spaces on asymmetrical blocks provide contiguous space for public use and activities, and changes in amenities and types of use. Opportunity to add utilities (fiber, communications, electric) to allow for changes in amenities and types of use.

Category	Evaluation Criteria	No Build	Median and New Asymmetrical	Center Running	Center Running and New Asymmetrical	Rebuild in Existing Configuration
Social and Environmental Impacts	Economic impacts: balance of opportunities and amenities along the Mall to benefit the public, residents, and adjacent property owners.	Asymmetrical blocks do not have similar opportunities for trees, gathering space, pedestrian circulation, or other amenities on both sides of the street.	Asymmetrical blocks do not have similar opportunities for trees, gathering space, pedestrian circulation, or other amenities on both sides of the street. Underutilized medians attract activities like loitering, which can deter patrons from adjacent businesses.	Provides the same opportunities for trees, gathering space, pedestrian circulation, and other amenities on both sides of the street.	Provides the same opportunities for trees, gathering space, pedestrian circulation, and other amenities on both sides of the street on center-running blocks. Asymmetrical blocks do not have similar opportunities for trees, gathering space, pedestrian circulation, or other amenities on both sides of the street.	Asymmetrical blocks do not have similar opportunities for trees, gathering space, pedestrian circulation, or other amenities on both sides of the street. Underutilized medians attract activities like loitering, which can deter patrons from adjacent businesses.
	Construction impacts: effects on businesses, residents, and transit operations.	Continued maintenance activities generate noise and limit transit mobility, and would continue to increase in frequency.	Construction activities generate noise and dust, and limit business access and transit and pedestrian mobility.	Construction activities generate noise and dust, and limit business access and transit and pedestrian mobility.	Construction activities generate noise and dust, and limit business access and transit and pedestrian mobility.	Construction activities generate noise and dust, and limit business access and transit and pedestrian mobility.

Category	Evaluation Criteria	No Build	Median and New Asymmetrical	Center Running	Center Running and New Asymmetrical	Rebuild in Existing Configuration
Social and Environmental Impacts (cont'd)	Land use impacts: consistency with local plans and policies[c]	Inconsistent with recommendations for infrastructure repair and upgrades.	Consistent with recommendations for transit service and infrastructure repair and upgrades.	Consistent with recommendations for transit service and infrastructure repair and upgrades.	Consistent with recommendations for transit service and infrastructure repair and upgrades.	Consistent with recommendations for transit service and infrastructure repair and upgrades.
	Water quality	Does not meet current water quality treatment requirements.	Ability to incorporate water quality treatment features into design.	Ability to incorporate water quality treatment features into design.	Ability to incorporate water quality treatment features into design.	Ability to incorporate water quality treatment features into design.
	Historic resource impacts: ability to honor original Mall design	Mall would retain its original design.	Ability to retain current locations of trees and lights on median blocks. Ability to retain current locations of trees and lights on wider sides of asymmetrical blocks. Small median with lights in between transit ways on asymmetrical blocks would be removed. Ability to accommodate existing paving pattern with some adjustments.	Trees and lights would be moved into rows on each side of transit way in a linear allée. Ability to maintain design element of double rows of alternating trees and lights. Ability to accommodate existing paving pattern with some adjustments.	On center-running blocks, trees and lights would be moved into rows on each side of transit way in a linear allée. Ability to maintain design element of double rows of alternating trees and lights. Ability to retain current locations of trees and lights on wider sides of asymmetrical blocks. Small median with lights in between transit ways on asymmetrical blocks would be removed. Ability to accommodate existing paving pattern with some adjustments.	Current locations of trees and lights would be retained. Ability to retain existing paving pattern.
	Degree of public and agency support for the alternative	Public: Minimal support Agency: Not supported	Public: Minimal support Agency: Not strongly supported	Public: Strong support Agency: Strong support	Public: Moderate support Agency: Moderate support	Public: Moderate support Agency: Not supported
Cost	Capital cost	None	High	High	High	High
	Maintenance cost	High	Low	Low	Low	Low
Construction	Construction duration	None	2 to 4 years	2 to 4 years	2 to 4 years	2 to 4 years

Notes:

[a] Applicable CPTED strategies recommended by RTD include: maximizing visibility of people and patron flow areas; providing adequate lighting minimizing shadows; landscape plantings that maximize visibility; elimination of structural hiding places; open lines of sight; and painting with light (RTD, 2016)

[b] One foot of sidewalk width can comfortably carry four pedestrians/minute and 240 pedestrians/hour (Gehl, 2010). Existing 8-foot walks are too narrow for peak period pedestrian volumes and do not adhere to CCD standards for 10-foot sidewalk widths downtown (CCD, 1993).

[c] Local plans and policies assessed for consistency: 2005 *Downtown Multimodal Access Plan* (CCD et al., 2005), 2007 *Denver Downtown Area Plan* (CCD et al., 2007), 2008 Urban Land Institute 16th Street Mall Study, 2010 *16th Street Urban Design Plan* (CCD et al., 2010), 2011 *Denver Moves: Bicycle and Pedestrian Connections* (CCD, 2011), and 2015 *Downtown Denver 16th Street Mall: Small Steps Towards Big Change* (Gehl, 2016).

B. Level 2 Evaluation

1. Alternatives and Options Evaluated

a) Alignment Alternatives

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

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

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

b) Pavement Materials Options

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

- Granite pavers with a mortar setting bed for the full Mall width
  - Pavers would be set on a drainable bedding on top of a concrete slab
  - If technically feasible, size could be matched to existing granite paver size
  - Existing pattern and color could be approximately replicated
- Unit pavers (granite, clay, or concrete) in a sand setting bed for the full Mall width
  - Pavers would be set on a drainable bedding on top of a concrete slab
  - Size would likely be 4 inches by 8 inches
  - Existing pattern and color could be approximately replicated
- Precast concrete slabs in the transit way with granite pavers in the sidewalks
  - Existing pattern in the transit way could be approximately replicated with scoring in the concrete
  - Existing colors in the transit way could be approximately replicated through integral color in the concrete
- Cast-in-place concrete option A in the transit way with granite pavers in the sidewalks
  - Standard cast-in-place concrete in the transit way, which would require approximately two replacements over a 40-year lifespan
  - Replicating the existing pattern in the transit way would be highly difficult to achieve
  - Replicating the existing color in the transit way would not be feasible
- Cast-in-place concrete option B in the transit way and granite pavers in the sidewalks
  - Concrete would be designed for a 40-year lifespan with three 5-inch mill and overlays (this type of concrete construction minimizes the cracking, chipping, spalling, and polishing common with standard concrete)

- Replicating the existing pattern would be highly difficult to achieve
- Replicating the existing color would not be feasible

Table 6-3 details the pavement materials evaluation.

c) Curb Options

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

Figure 6-1. Existing Vertical Curb and Existing Pan on Median Block

Figure 6-2. Vertical Curb Unit

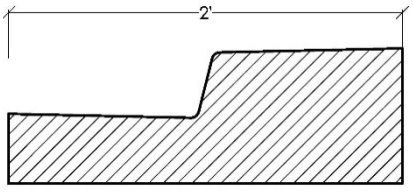


Figure 6-3. Pan Unit

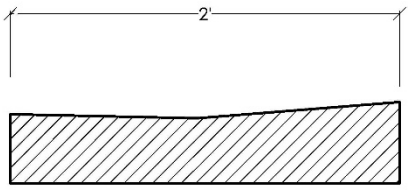


Table 6-4 details the curb options evaluation, and **Section 7.1** describes the design features associated with each curb option in more detail relative to safety, accessibility, and effects to the historic pavement pattern.

2. Initial Conclusions

a) Alignment Alternatives

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

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

- The Center Running Alternative would provide a safer condition because trees would be placed between pedestrian walking areas and transit ways on both sides of the block, better delineating pedestrian and transit areas, consistent with RTD standards (RTD, 2016a) and guidance (NACTO, 2013; NACTO, 2016; FHWA, 2017). In contrast, the narrow side of the asymmetrical blocks in the Center-running and New Asymmetrical Alternative would have the pedestrian walking area immediately adjacent to the transit way, with no tree/amenity zone or other buffer between them.
- The Center Running Alternative would provide better opportunities for public use because trees would be present on both sides of the block, providing shade and zones for public gathering and shuttle stops; in contrast, the narrow side of the asymmetrical blocks in the Center-running and New Asymmetrical Alternative would not have trees or space for shuttle stops that do not obstruct the pedestrian walking area.
- The Center Running Alternative would provide equitable distribution of pedestrian space and public amenities, providing benefits for public use and economic vitality for businesses on both sides of the Mall. The Center-running/New Asymmetrical Alternative would perpetuate inequitable distribution of amenity space and sidewalk capacity fronting businesses, resulting in more public use and a larger customer base adjacent to businesses on wide sides.

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

b) Pavement Materials Options

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

options need to be replaced or receive concrete overlays throughout the life of the facility, creating impacts at a later date.

c) Curb Options

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

3. Identification of the LPA

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

- Providing safer conditions by creating an amenity zone with a row of trees that would physically separate the pedestrian walkway and transit way and provide space for shuttle stops within the amenity zone, so people waiting for the bus do not obstruct the pedestrian walkway.
- Minimizing impacts to the historic design by aligning one row of trees between the asymmetrical and center-running blocks so there is a straight line of trees down the Mall, which is an element of the existing design, and maintaining the existing progression and location of a beginning, middle, and end of the Mall by retaining the design concept of five and a half asymmetrical blocks at the beginning and end of the Mall and seven symmetrical blocks in the middle of the Mall.
- Providing trees and public amenity space on both sides of the asymmetrical blocks, more equitably distributing space and providing more equal benefits to public use and business vitality.

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

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

The added space for an amenity zone on the narrow side of the asymmetrical block in the Center Running and New Asymmetrical Alternative allows for a physical and visual delineation between the transit way and the pedestrian walkway, in compliance with RTD standards and national guidance. Further, mobility and public use are part of the purpose and need for the project. The proposed dimensions for the pedestrian walkway and patio/gathering area are needed to meet those factors of the purpose and need.

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

4. Design Options to the LPA

As part of consultation under Section 106 of the National Historic Preservation Act, Historic Denver requested CCD and RTD explore modifications to the LPA's New Asymmetrical block design on a subset of the original asymmetrical blocks. On asymmetrical blocks, the LPA would shift the pavement pattern, including the locations of trees and lights, two feet closer to the buildings (north) to provide space for an amenity zone on the narrow side of the block. The amenity zone is necessary to provide safe physical and visual delineation between the transit way and the pedestrian walkway.

Historic Denver requested modifications focused on rebuilding in place the pedestrian area on the wide (north) side of the block, from the building faces to the outer (north) edge of the existing transit way, on 3 ½ of the original 5 ½ asymmetrical blocks, from Market Street to Lawrence Street and from Court Place to Broadway. This would eliminate the 2-foot "shift" in the pavement pattern and rows of lights and trees on the wide side of the block, and would reduce space for public use on the narrow side of the block by 2 feet. Historic Denver proposed modifications to these 3 ½ blocks because they felt existing building uses and plazas on adjacent properties create a different context on these blocks.

To maintain the concept of three "rooms" on the Mall, Historic Denver proposed extending the Center Running block design one block farther on each end, into two of the existing asymmetrical blocks, rather than having additional transitions and multiple asymmetrical block designs.

a) Design Options Evaluated

CCD and RTD developed two design options to respond to Historic Denver's request. Both design options would retain the existing pavement pattern location, including locations of trees and lights, on the wide side of the applicable asymmetrical blocks (rather than shift the pattern over 2 feet as proposed in the LPA), and would add 5 feet to the narrow side of the block (rather than add 7 feet as proposed in the LPA). The 2-foot difference would need to be removed from one of the three uses on the narrow side of the block: patio/gathering space, pedestrian walkway, or amenity zone. The pedestrian walkway cannot be smaller than 10 feet, thus the 2-foot width would be removed from the patio/gathering space or amenity zone. The resulting design options vary in where the 2-foot difference on the narrow side of the block would occur. Under both design options, the Center Running blocks would be extended one block farther in each direction, illustrated in **Figure 6-4**.

In comparison to the LPA, Design Option 1 would reduce the amenity zone by 2 feet, and the patio width would remain 9 feet as it is today, illustrated in **Figure 6-5**. The 3-foot amenity zone would not be wide enough to accommodate a row of trees and lights or other street furnishings. In order to safely separate and delineate the pedestrian walkway and the transit way, it would be necessary to add a row of vertical bollards in the amenity zone. A secondary light source would also need to be added to provide adequate nighttime lighting.

In comparison to the LPA, Design Option 2 would reduce the patio width by 2 feet. The 7-foot-wide patio space would reduce seating capacity by one-third from the existing (and proposed LPA) 9-foot width. The 5-foot amenity zone would be wide enough to accommodate a row of trees and lights and other street furnishings, similar to the LPA. Unlike the LPA, the row of trees would not be able to align with the row of trees in the center running blocks.

Both design options would reconstruct the half-block (the triangle plaza block from Cleveland Place to Broadway) with pavers in the same pattern and location as the original design; other elements of the triangle block, including the lights, trees, and fountain, would also be reconstructed in same location.

Table 6-5 details the design options evaluation.

Figure 6-4. Block Design Location – Existing, LPA, and LPA Design Options

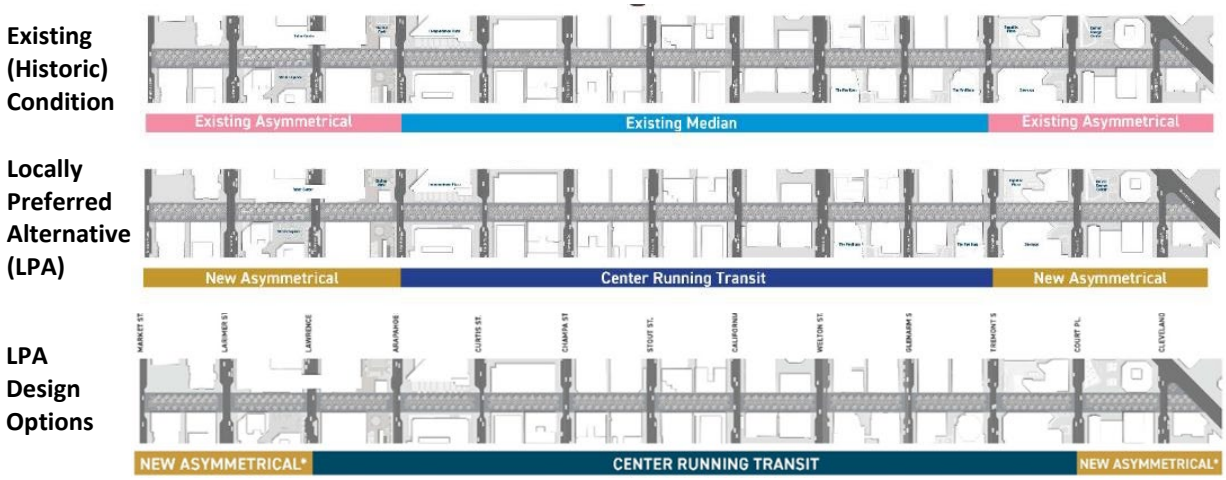
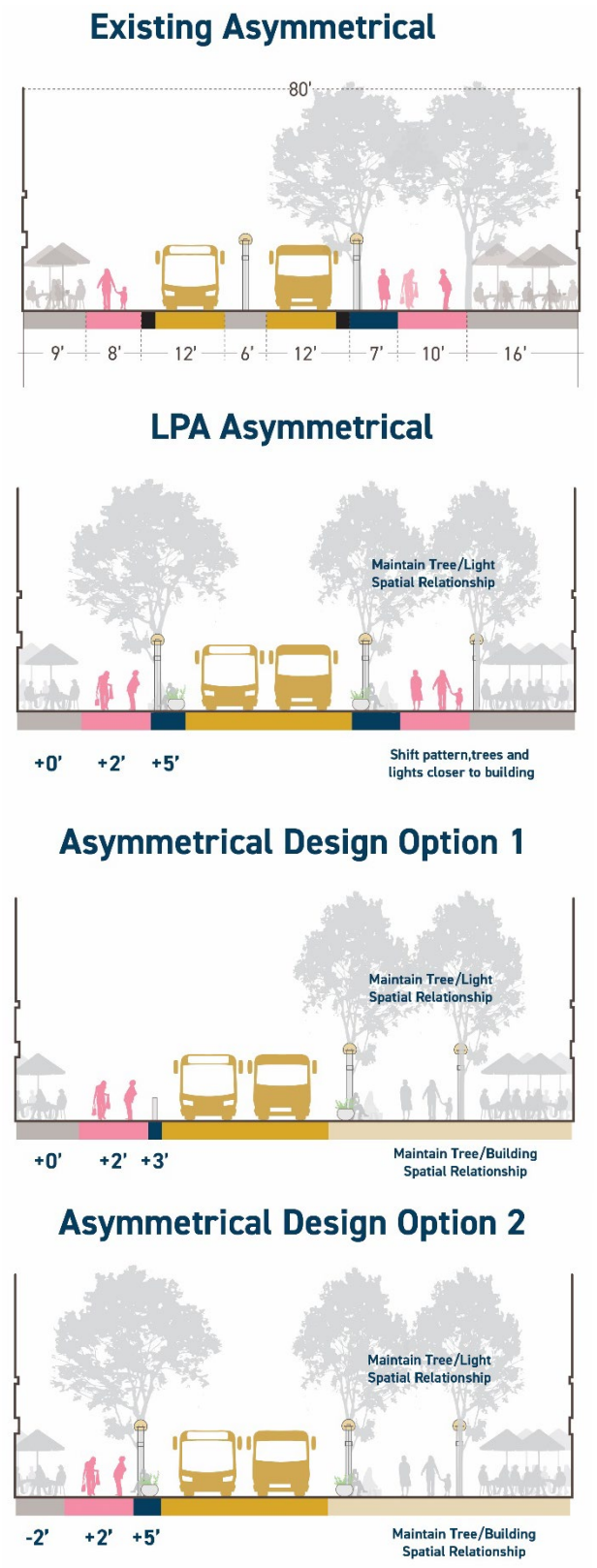


Figure 6-5. Cross Section Design – Existing, LPA, and LPA Design Options



b) Conclusions

The Level 2 analysis of the design options concluded:

- Design Option 1 is eliminated from further consideration
- Design Option 2 is carried forward for further study in the EA
- Reconstruction of the triangle plaza block between Cleveland Place and Broadway in the same pattern and location as the original design is incorporated into the LPA design

Both design options 1 and 2 would accomplish Historic Denver's goals of rebuilding in place the pedestrian area on the wide (north) side of the block. The 3-foot amenity zone in Design Option 1 does not provide space for trees, lights, or street furnishings on the narrow side of the block and requires introducing vertical bollards, which are undesirable new visual elements, to safely separate pedestrians and transit. Design Option 2 would not meet the public use needs of the Project as well as the LPA, but it would better meet the purpose and need and have fewer impacts than Design Option 1. The unique conditions of the half-block triangle plaza between Cleveland Place and Broadway provide the opportunity to incorporate into the LPA reconstruction of this half-block in its original design.

Table 6-2. Level 2 Alternatives Evaluation

Category	Criteria	No Build	Alternative Median and New Asymmetrical	Alternative Center Running	Alternative Center Running and New Asymmetrical	Rebuild in Existing Configuration	Partial Repair
Economics and Cost							
Failing pavement system in constant need of repair	Capital cost	N/A	$76M to $137M depending on pavement material	$76M to $137M depending on pavement material	$76M to $137M depending on pavement material	$76M to $137M depending on pavement material	$62M to $88M
	Annual transit way and sidewalk maintenance cost	$1.2M	$85,000 to $310,000, depending on pavement material	$85,000 to $310,000, depending on pavement material	$85,000 to $310,000, depending on pavement material	$85,000 to $310,000, depending on pavement material	$560,000
	Future transit way replacement cost	N/A	$0 to $20M, depending on pavement material	$0 to $20M, depending on pavement material	$0 to $20M, depending on pavement material	$0 to $20M, depending on pavement material	$54M
	40-year investment	$46.6M	$85M to $152M	$85M to $152M	$85M to $152M	$85M to $152M	$138M to $164M
Outdated infrastructure does not meet current ADA requirements and leads to poor tree health; lack of water quality treatment and modern fiber optic and communications utilities doesn't meet modern-day needs	Ability to address ADA deficiencies[a]	Not possible to address all ADA deficiencies	Not a discriminator: Can address all ADA deficiencies	Not a discriminator: Can address all ADA deficiencies	Not a discriminator: Can address all ADA deficiencies	Not a discriminator: Can address all ADA deficiencies	Not a discriminator: Can address all ADA deficiencies
	Tree infrastructure is updated to modern standards.	Ranks poorly for tree health: No replacement of obsolete tree infrastructure (tree boxes and irrigation)	Ranks well for tree health: Installs modern tree planting infrastructure and new trees; conflicting utilities would be relocated.	Ranks well for tree health: Installs modern tree infrastructure and new trees; conflicting utilities would be relocated.	Ranks well for tree health: Installs modern tree infrastructure and new trees; conflicting utilities would be relocated.	Ranks well for tree health: Installs modern tree infrastructure and new trees; conflicting utilities would be relocated.	Ranks slightly better than No Build Alternative: Replacement of missing and dead trees. No replacement of obsolete tree infrastructure (tree boxes and irrigation).
	Water quality treatment is added to stormwater drainage system.	No water quality improvements: No change in treatment of stormwater runoff beyond maintenance activities and normal Mall janitorial activities.	Improves water quality: Installs stormwater quality treatment facilities, meeting City standards.	Improves water quality: Installs stormwater quality treatment facilities, meeting City standards.	Improves water quality: Installs stormwater quality treatment facilities, meeting City standards.	Improves water quality: Installs stormwater quality treatment facilities, meeting City standards.	No water quality improvements: No change in treatment of stormwater runoff beyond maintenance activities and normal Mall janitorial activities.
	Add fiber optic utility infrastructure and update/increase electric utility capabilities.	No improvement: No fiber optic utilities for modern technology and inadequate electric power supply for programming needs.	Not a discriminator: Installs new fiber optic and upgraded electric utilities.	Not a discriminator: Installs new fiber optic and upgraded electric utilities.	Not a discriminator: Installs new fiber optic and upgraded electric utilities.	Not a discriminator: Installs new fiber optic and upgraded electric utilities.	Not a discriminator: Installs new fiber optic and upgraded electric utilities.

Category	Criteria	No Build	Alternative Median and New Asymmetrical	Alternative Center Running	Alternative Center Running and New Asymmetrical	Rebuild in Existing Configuration	Partial Repair
Safety and Security							
Poor delineation between undersized[b] pedestrian walks and transit causes near misses between pedestrians and transit vehicles	Pedestrian overflow into transit ways	No change: Median blocks: 8-foot outer pedestrian walks remain undersized, resulting in pedestrian overflow into transit ways. Asymmetrical blocks: 8-foot outer pedestrian walks on narrow side of block remain undersized, resulting in pedestrian overflow into transit ways. 14-foot walkways on wide side of block accommodate pedestrians without overflow into transit ways.	Ranks third: Median blocks: 8-foot outer pedestrian walks remain undersized, resulting in pedestrian overflow into transit ways. New Asymmetrical blocks: 10-foot walkways on asymmetrical blocks accommodate pedestrians without overflow into transit ways.	Ranks best: Center-running blocks: 10-foot-minimum pedestrian walks accommodate pedestrians without overflow into transit ways.	Ranks second best: Center-running blocks: 10-foot-minimum pedestrian walks accommodate pedestrians without overflow into transit ways. New Asymmetrical blocks: 10-foot walkways on asymmetrical blocks accommodate pedestrians without overflow into transit ways.	Same as No Build	Same as No Build
	Delineation between pedestrians and transit	No change: Median blocks: Pedestrian walks remain directly adjacent to transit way and do not meet RTD standards and guidance[c] for physical separation and delineation of pedestrian and vehicular areas. Asymmetrical blocks: Pedestrian walks separated by tree/amenity zones as recommended by guidance[c] on wide side of block. Ability to shift pedestrian walk to storefront on wide side of block to further separate pedestrians from transit.	Ranks third: Median blocks: Pedestrian walks remain directly adjacent to transit way and do not meet RTD standards and guidance[c] for physical separation and delineation of pedestrian and vehicular areas. New Asymmetrical blocks: Pedestrian walks separated by tree/amenity zones as recommended by guidance[c] on wide side of block. Ability to shift pedestrian walk to storefront on wide side of block to further separate pedestrians from transit.	Ranks best: Center-running blocks: Pedestrian walks separated by tree/amenity zones as recommended by guidance[c]. Ability to shift pedestrian walks to storefronts and further separate pedestrians from transit. Additional options for delineation between pedestrian and transit areas: Same options for delineation between pedestrian and transit areas as Median and New Asymmetrical Alternative.	Ranks second best: Center-running blocks: Pedestrian walks separated by tree/amenity zones as recommended by guidance[c]. Ability to shift pedestrian walks to storefronts and further separate pedestrians from transit. New Asymmetrical blocks: Same as Median and New Asymmetrical alternative. Options for delineation between pedestrian and transit areas: Same options for delineation between pedestrian and transit areas as Median and New Asymmetrical Alternative.	Same as No Build	Same as No Build

Category	Criteria	No Build	Alternative Median and New Asymmetrical	Alternative Center Running	Alternative Center Running and New Asymmetrical	Rebuild in Existing Configuration	Partial Repair
Poor delineation between undersized[b] pedestrian walks and transit causes near misses between pedestrians and transit vehicles (continued)	Delineation between pedestrians and transit	Pedestrian walks on narrow side of block remain directly adjacent to transit ways and do not meet RTD standards and guidance[c] for physical separation and delineation of pedestrian and vehicular areas. 4-inch curb of same appearance and material as pedestrian and transit surface is the only delineation between pedestrian and transit areas.	Pedestrian walks on narrow side of block remain directly adjacent to transit way and do not meet RTD standards and guidance[c] for physical separation and delineation of pedestrian and vehicular areas. Additional options for delineation between pedestrian and transit areas: Retain existing 4-inch curb; install higher curb between walks and transit; barrier or bollards between walks and transit; shift pedestrian walks adjacent to storefronts; provide visual and/or tactile difference in materials between walks and transit; use technology to delineate walks and transit, such as colored lights.				
Higher crash numbers adjacent to median blocks (Arapahoe Street to Tremont Place)	Ability to address higher crash locations from Arapahoe Street to Tremont Place	No change: Same street cross section and conflict/crossing points – median and asymmetrical geometrics remain. Same number of conflict points remain at each intersection and block, and same cross-street width remains in place.	Moderate improvement to higher crash locations: Intersection bulb-outs reduce cross-street width at intersections, providing moderate safety benefit from reduced crossing distance and improved visibility/conspicuity for pedestrians. Same number of conflict points remain at each intersection and block.	Greatest improvement to higher crash locations: Intersection bulb-outs reduce cross-street width at intersections, providing moderate safety benefit from reduced crossing distance and improved visibility/conspicuity for pedestrians. Number of conflict points reduced at intersections and within blocks, in former median blocks.	Greatest improvement to higher crash locations: Intersection bulb-outs reduce cross-street width at intersections, providing moderate safety benefit from reduced crossing distance and improved visibility/conspicuity for pedestrians. Number of conflict points reduced at intersections and within blocks, in former median blocks.	Moderate improvement to higher crash locations: Intersection bulb-outs reduce cross-street width at intersections, providing moderate safety benefit from reduced crossing distance and improved visibility/conspicuity for pedestrians. Same number of conflict points remain at each intersection and block.	Moderate improvement to higher crash locations: Intersection bulb-outs reduce cross-street width at intersections, providing moderate safety benefit from reduced crossing distance and improved visibility/conspicuity for pedestrians. Same number of conflict points remain at each intersection and block.

Category	Criteria	No Build	Alternative Median and New Asymmetrical	Alternative Center Running	Alternative Center Running and New Asymmetrical	Rebuild in Existing Configuration	Partial Repair
Slick pavement surface causes pedestrian slips and falls, bus traction problems, compounded by snowy or icy conditions in winter	Pavement surface reduces "slip, trip and fall" risks	No change: Slick granite surface would remain the same assuming no further modifications.	Not a discriminator: Pavement design options comprise granite pavers with a higher friction finish, unit pavers, precast concrete, and cast-in-place concrete.	Not a discriminator: Pavement design options comprise granite pavers with a higher friction finish, unit pavers, precast concrete, and cast-in-place concrete.	Not a discriminator: Pavement design options comprise granite pavers with a higher friction finish, unit pavers, precast concrete, and cast-in-place concrete.	Not a discriminator: Pavement design options comprise granite pavers with a higher friction finish, unit pavers, precast concrete, and cast-in-place concrete.	Ranks below other action alternatives: Granite pavers in transit ways would be cleaned and refinished to improve surface friction.
Safety and security systems should be upgraded to current standards.	Ability to accommodate future technology for security best practices	No improvements: No fiber optic utilities or updated electric power supply to meet future security technology needs.	Not a discriminator: Installs new fiber optic and upgraded electric utilities.	Not a discriminator: Installs new fiber optic and upgraded electric utilities.	Not a discriminator: Installs new fiber optic and upgraded electric utilities.	Not a discriminator: Installs new fiber optic and upgraded electric utilities.	Not a discriminator: Installs new fiber optic and upgraded electric utilities.
Transit mobility and operations							
Frequent maintenance disrupts transit operations, and would be more disruptive as ridership increases	Maintenance effects on bus operations efficiency and requirements	No change: Maintenance frequency continues to increase, slowing bus operations.	Not a discriminator: Frequency of pavement maintenance impacts on bus operations substantially reduced from current conditions, under any pavement design option.	Not a discriminator: Frequency of pavement maintenance impacts on bus operations substantially reduced from current conditions, under any pavement design option.	Not a discriminator: Frequency of pavement maintenance impacts on bus operations substantially reduced from current conditions, under any pavement design option.	Not a discriminator: Frequency of pavement maintenance impacts on bus operations substantially reduced from current conditions, under any pavement design option.	Ranks below other action alternatives: Replacement of sub-base reduces frequency of maintenance impacts on bus operations.
The demand for transit services is projected to increase to 70,000 riders/day in 2035	Provision of connectivity between DUS and CCS, and crossing bus and light rail routes in between	No change: Maintains existing connection. Service expansion options comprise operating buses in tandem or procuring larger buses.	Same as No Build	Same as No Build	Same as No Build	Same as No Build	Same as No Build
	Accommodation of tandem and/or larger buses at shuttle stops	Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (trees, lights) prevent bus boarding along length of block.	Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (trees, lights) prevent bus boarding along length of block.	Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (trees, lights) prevent bus boarding along length of block.	Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (trees, lights) prevent bus boarding along length of block.	Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (trees, lights) prevent bus boarding along length of block.	Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (trees, lights) prevent bus boarding along length of block.
Transit operations would become increasingly difficult as the volume of passengers and pedestrian use increases on the Mall	Effect on transit operations	Not endorsed by RTD: Maintains slick surface, high maintenance frequency, and maneuvering between median and asymmetrical blocks.	Agreeable, but less preferred, by RTD: Bus operators need to protect both the curb and median sides of the bus.	Most preferred by RTD: Buses operate on continuous lane assignment throughout Mall and bus operators need to protect only the curb side of the bus. Eliminating the median improves the safety of bus operations.	Most preferred by RTD: Buses operate on more continuous lane assignment throughout Mall and bus operators need to protect only the curb side of the bus. Eliminating the median improves the safety of bus operations.	Agreeable, but less preferred, by RTD: Bus operators need to protect both the curb and median sides of the bus.	Agreeable, but less preferred, by RTD: Bus operators need to protect both the curb and median sides of the bus.

Category	Criteria	No Build	Alternative Median and New Asymmetrical	Alternative Center Running	Alternative Center Running and New Asymmetrical	Rebuild in Existing Configuration	Partial Repair
During construction the efficiency of transit operations would be dramatically reduced	Minimum disruption during construction	Lowest impact: Limited to maintenance activities which vary by year.	Comparable to other action alternatives except Partial Repair: Major impact during the construction period; length of construction period varies depending on pavement design.	Comparable to other action alternatives except Partial Repair: Major impact during the construction period; length of construction period varies depending on pavement design.	Comparable to other action alternatives except Partial Repair: Major impact during the construction period; length of construction period varies depending on pavement design.	Comparable to other action alternatives except Partial Repair: Major impact during the construction period; length of construction period varies depending on pavement design.	Less impact than the other action alternatives: Construction would occur primarily in the transit ways and would have less disruption in the pedestrian areas than the other action alternatives.
Pedestrian mobility							
Sidewalks are undersized for pedestrian volumes[d] and CCD standards (10-foot sidewalks downtown).	Pedestrian volumes and accessibility guidelines are accommodated	No change: Median blocks: Pedestrian volumes and CCD standards not accommodated - 1,920 pedestrians/hour on 8-foot sidewalks next to patio/gathering space. Asymmetrical blocks: Pedestrian volumes and CCD standards not accommodated on narrow side of block – 1,920 pedestrians/hour on 8-foot sidewalks next to patio/gathering space. Pedestrian volumes and accessibility guidelines are accommodated on wide side of block - 3,360 pedestrians/hour on 14-foot sidewalks, with additional space for pedestrians and/or amenities.	Minimal change from No Build: Median blocks: No change from No Build. New Asymmetrical blocks: Pedestrian volumes and CCD standards are accommodated - 2,400 pedestrians/hour on 10-foot sidewalks next to patio/gathering space, with additional space for pedestrians and/or amenities.	Center-running blocks: Pedestrian volumes and CCD standards are accommodated - 2,400 pedestrians/hour on 10-foot sidewalks next to patio/gathering space, with additional space for pedestrians, shuttle stops, and/or amenities. New Asymmetrical blocks: Pedestrian volumes and CCD standards are accommodated - 2,400 pedestrians/hour on 10-foot sidewalks next to patio/gathering space, with additional space for pedestrians, shuttle stops, and/or amenities.	Center-running blocks: Pedestrian volumes and CCD standards are accommodated - 2,400 pedestrians/hour on 10-foot sidewalks next to patio/gathering space, with additional space for pedestrians, shuttle stops, and/or amenities.	Same as No Build	Same as No Build

Category	Criteria	No Build	Alternative Median and New Asymmetrical	Alternative Center Running	Alternative Center Running and New Asymmetrical	Rebuild in Existing Configuration	Partial Repair
Public Use Functionality							
Limited usability of divided public space on median blocks and narrow sides of asymmetrical blocks to accommodate patio/gathering space[f] and pedestrian needs.	Width for patio and gathering space	No change: Median Blocks: Walkways in outer pedestrian areas of median blocks are not wide enough to accommodate 9-foot patio/gathering space and 10-foot pedestrian sidewalk. Medians are not conducive to stationary gathering activities because they are too narrow, lack edges, and are surrounded by transit shuttles[g]. Asymmetrical Blocks: Walkways on narrow sides of asymmetrical blocks are not wide enough to accommodate 9-foot patio/gathering space and 10-foot pedestrian walk.	Ranks third: Median Blocks: Walkways in outer pedestrian areas of median blocks are not wide enough to accommodate 9-foot patio/gathering space and 10-foot pedestrian walk. Medians are not conducive to stationary gathering activities because they are too narrow, lack edges, and are surrounded by transit shuttles[g]. New Asymmetrical Blocks: Walkways on both sides of asymmetrical blocks are wide enough to accommodate 9-foot patio/gathering space and 10-foot pedestrian walk, with additional space for amenities and/or pedestrians on wide side.	Ranks best: Center-running Blocks: Walkways on both sides of blocks are wide enough for 9-foot patio/gathering space and 10-foot pedestrian sidewalk, with additional space for amenities and/or pedestrians.	Ranks second best: Center-running Blocks: Walkways on both sides of blocks are wide enough for 9-foot patio/gathering space and 10-foot pedestrian walk, with additional space for amenities and/or pedestrians. New Asymmetrical Blocks: Walkways on both sides of asymmetrical blocks are wide enough to accommodate 9-foot patio/gathering space and 10-foot pedestrian walk, with additional space for amenities and/or pedestrians on wide side.	Same as No Build	Same as No Build
Negative perception of safety and lack of natural surveillance inhibits positive public use of Mall.	Adherence to best practices for natural surveillance, activation, and positive public use of pedestrian and gathering areas.	No change: Median blocks have low public use and natural surveillance, increased negative behaviors (for example, panhandling[h]), and decreased sense of safety because of size, physical separation from primary walkways, and frequent shuttle service on each side. Asymmetrical blocks can accommodate best practices for natural surveillance and accommodate positive public use and activities.	Same as No Build	Improved over No Build: Replaces public space in medians with consolidated public space adjacent to buildings, increasing natural surveillance and adhering to safety and security best practices.	Improved over No Build: Replaces public space in medians with consolidated public space adjacent to buildings, increasing natural surveillance and adhering to safety and security best practices. New Asymmetrical blocks can accommodate best practices for natural surveillance and accommodate positive public use and activities.	Same as No Build	Same as No Build

Category	Criteria	No Build	Alternative Median and New Asymmetrical	Alternative Center Running	Alternative Center Running and New Asymmetrical	Rebuild in Existing Configuration	Partial Repair
Community and Environment							
Construction impacts	Construction impacts	Lowest impact: Limited to maintenance activities which vary by year.	Comparable to other action alternatives except Partial Repair: Major impact during the construction period; length of construction period varies depending on pavement design.	Comparable to other action alternatives except Partial Repair: Major impact during the construction period; length of construction period varies depending on pavement design.	Comparable to other action alternatives except Partial Repair: Major impact during the construction period; length of construction period varies depending on pavement design.	Comparable to other action alternatives except Partial Repair: Major impact during the construction period; length of construction period varies depending on pavement design.	Less impact than other action alternatives: Construction would occur primarily in the transit ways and would have less disruption in the pedestrian areas than the other action alternatives.
Environmental impacts	Historic resources impacts	Minimal change from existing conditions: The rate at which the Mall deteriorates from use would increase as ridership and pedestrian use increase. Ad hoc replacement of pavers would continue.	Impacts historic properties. More change than Rebuild in Existing Configuration and Partial Repair alternatives: Median blocks maintain historic design. New Asymmetrical blocks modify historic design; can accommodate existing pavement pattern and spatial relationships, with some adjustments.	Impacts historic properties. More change than Rebuild in Existing Configuration and Partial Repair alternatives: Center-running design replaces both median and asymmetrical blocks. Ability to accommodate existing pavement pattern, with minor adjustments.	Impacts historic properties. More change than Rebuild in Existing Configuration and Partial Repair alternatives: Center-running design replaces median blocks. Ability to accommodate existing pavement pattern, with minor adjustments. New Asymmetrical blocks modify historic design; can accommodate existing pavement pattern and spatial relationships, with some adjustments.	Impacts historic properties. Less change than all but the Partial Repair alternative: No change in spatial configuration or pavement pattern, but more change than Partial Repair alternative as a result of reconstruction of entire Mall.	Impacts historic properties. Least change from existing conditions: No change in spatial configuration or pavement pattern.

Category	Criteria	No Build	Alternative Median and New Asymmetrical	Alternative Center Running	Alternative Center Running and New Asymmetrical	Rebuild in Existing Configuration	Partial Repair
Environmental impacts (continued)	Socioeconomic impacts	Minimal changes from existing conditions.	Minimal changes to social, economic, and land use resources. Asymmetrical blocks perpetuate inequitable distribution of amenity space and sidewalk capacity fronting businesses. Wide sides of block allow more space for walking and gathering than narrow sides, resulting in larger customer base adjacent to businesses on wide sides.	Potential benefits to social, economic, and land use resources because of higher public use, perception of safety, and equitable distribution of space. Center-running blocks provide equitable distribution of pedestrian space and public amenities, including tree canopy and gathering space, providing benefits for economic vitality of businesses on both sides of the Mall.	Potential benefits to social, economic, and land use resources because of higher public use and perception of safety. Center-running blocks provide equitable distribution of pedestrian space and public amenities, including tree canopy and gathering space, providing benefits for economic vitality of businesses on both sides of the Mall. Asymmetrical blocks perpetuate inequitable distribution of amenity space and sidewalk capacity fronting businesses. Wide sides of block allow more space for walking and gathering than narrow sides, resulting in larger customer base adjacent to businesses on wide sides.	Minimal changes to social, economic, and land use resources. Asymmetrical blocks perpetuate inequitable distribution of amenity space and sidewalk capacity fronting businesses. Wide sides of block allow more space for walking and gathering than narrow sides, resulting in larger customer base adjacent to businesses on wide sides.	Minimal changes to social, economic, visual, and land use resources. Asymmetrical blocks perpetuate inequitable distribution of amenity space and sidewalk capacity fronting businesses. Wide sides of block allow more space for walking and gathering than narrow sides, resulting in larger customer base adjacent to businesses on wide sides.
	Natural resources impacts	Minimal changes from existing conditions.	Not a discriminator: Replaces 400,000 square feet of hardscape, installs water quality treatment (benefit to water quality). No changes to other resources.	Not a discriminator: Replaces 400,000 square feet of hardscape, installs water quality treatment (benefit to water quality). No changes to other resources.	Not a discriminator: Replaces 400,000 square feet of hardscape, installs water quality treatment (benefit to water quality). No changes to other resources.	Not a discriminator: Replaces 400,000 square feet of hardscape, installs water quality treatment (benefit to water quality). No changes to other resources.	Not a discriminator: Replaces 400,000 square feet of hardscape, installs water quality treatment (benefit to water quality). No changes to other resources.
Public and agency support	Level of Agency Support	Not supported: Not supported by CCD, RTD, or DDP.	Not strongly supported: Not strongly supported by CCD, RTD, or DDP.	Highest support: Strongly supported by CCD and DDP. Supported by RTD because of improved guideway geometry as compared to the other build alternatives.	Second highest support: Not as strongly supported by CCD or DDP when compared to the Center Running Alternative. Supported by RTD because of improved guideway geometry as compared to the other build alternatives.	Not supported: Not supported by CCD or DDP. Neutral support by RTD.	Not supported: Not supported by CCD, RTD, or DDP.

Category	Criteria	No Build	Alternative Median and New Asymmetrical	Alternative Center Running	Alternative Center Running and New Asymmetrical	Rebuild in Existing Configuration	Partial Repair
	Level of Public Support as demonstrated at public meetings and hearings	Minimal support	Minimal support	Strong support	Moderate support	Moderate support	Not presented during Level 1 screening; recommended alternative in 2010 *16th Street Urban Design Plan* (CCD et al.)
Ability to meet the Project Purpose and Need	Satisfies the Project Purpose and Need	Does not satisfy any Purpose and Need elements.	Ranks third in fulfillment of the Purpose and Need. Replaces failing infrastructure. Improves pedestrian safety and mobility on asymmetrical blocks through wider sidewalks; does not physically separate pedestrian walk from transit way on narrow side of asymmetrical block. Supports future transit mobility. Does not meet requirements for sidewalk and patio/gathering space width. Does not adhere to best practices for natural surveillance and public activation on median blocks. Does not provide flexibility for public use as well as the alternatives with center-running blocks.	Ranks first in fulfillment of the Purpose and Need. Replaces failing infrastructure. Improves pedestrian safety and mobility through wider sidewalks and separation of pedestrian walks from transit ways. Supports future transit mobility. Meets requirements for adequate patio/gathering and sidewalk space. Adheres to best practices for natural surveillance and public activation. Provides flexibility for public use by allowing pedestrian walks to shift against building fronts to consolidate gathering space under trees.	Ranks second in fulfillment of the Purpose and Need. Replaces failing infrastructure. Improves pedestrian safety and mobility through wider sidewalks and separation of pedestrian walks from transit ways on center-running blocks and the wide side of new asymmetrical blocks; does not physically separate pedestrian walk from transit way on narrow side of asymmetrical block. Supports future transit mobility. Meets requirements for adequate patio/gathering and sidewalk space. Adheres to best practices for natural surveillance and public activation. Provides flexibility for public use by allowing pedestrian walks to shift against building fronts to consolidate gathering space under trees on center-running blocks and on wide sides of asymmetrical blocks.	Ranks fourth in fulfillment of the Purpose and Need. Replaces failing infrastructure. Does not improve pedestrian safety and mobility. Supports future transit mobility Does not meet requirements for sidewalk and patio/gathering space width. Does not adhere to best practices for natural surveillance and public activation on median blocks. Does not provide flexibility for public use as well as the alternatives with center-running blocks.	Ranks last in fulfillment of the Purpose and Need. Replaces failing infrastructure in the transit ways, but not in other areas (pedestrian areas, and tree infrastructure) Does not improve pedestrian safety and mobility Supports future transit mobility Does not meet requirements for sidewalk and patio/gathering space width Does not adhere to best practices for natural surveillance and public activation on median blocks. Does not provide flexibility for public use as well as the alternatives with center-running blocks.
Disposition	Carry forward as required by NEPA	Do not carry forward	Carry forward	Carry forward	Do not carry forward	Do not carry forward	

[a] ADA deficiencies and recommendations documented in MTC, 2010.

[b] One foot of sidewalk width can comfortably carry four pedestrians/minute and 240 pedestrians/hour (Gehl, 2010). Existing 8-foot walks are too narrow for peak period pedestrian volumes and do not adhere to CCD standards for 10-foot sidewalk widths downtown (CCD, 1993).

[c] RTD, 2016a; NACTO, 2013; NACTO, 2016; FHWA, 2017.

[d] CCD counted hourly pedestrian volumes in 2015 and 2016 in representative locations on the Mall. Pedestrian volumes exceed the carrying capacity of the sidewalks on the median blocks on the east end of the Mall, reaching up to 4,100 pedestrians per hour during the peak weekday lunch hour. The west end of the Mall reaches up to 3,000 pedestrians/hour near the DUS neighborhood (Gehl, 2016). Future (2040) midday peak pedestrian volumes are estimated at 4,800 pedestrians/hour in the CBD and 4,000 pedestrians/hour in the DUS neighborhood, based on existing peak hour pedestrian volumes growing at rate of forecasted employment growth from 2015 to 2040 of 0.7 percent annually in the Central Business District (CBD) neighborhood and 1.2 percent annually in the DUS neighborhood (**Table 4** of the *Land Use and Socioeconomic Existing Conditions* technical memorandum located in **Appendix B**).

[e] CCD, 1993.

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

[g] People prefer to gather at edges, and people inherently back away from fast-moving objects (Gehl, 2010).

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

M = million dollars

Table 6-3. Pavement Options Analysis

Category	Criteria	Granite pavers with a mortar setting (full width of Mall)	Unit pavers with a sand setting (full width of Mall)	Precast concrete slabs w/pattern, color (transit); granite pavers (walks)	Cast-in-place concrete option A[a], no pattern, color (transit); granite pavers (walks)	Cast-in-place concrete option B[a], no pattern, color (transit); granite pavers (walks)
Economics and Approximate Cost						
Failing pavement system in constant need of repair	Capital cost (millions)	$114 (range based on market fluctuation: $97 to $137)	$108 (range based on market fluctuation: $92 to $130)	$98 (range based on market fluctuation: $83 to $118)	$88 (range based on market fluctuation: $75 to $106	$92 (range based on market fluctuation: $78 to $110)
	Annual transit way and sidewalk maintenance cost	$309,000	$309,000	$106,000	$85,000	$196,000
	Future transit way replacement cost (millions)	$0	$0	$15.5	$20.0	$0
	40-year investment (millions)	$126.4 (range based on market fluctuation: $107 to $152)	$120.4 (range based on market fluctuation: $102 to $144)	$117.8 (range based on market fluctuation: $100 to $141)	$111.4 (range based on market fluctuation: $95 to $134)	$99.8 (range based on market fluctuation: $85 to $120)
Safety and Security						
Poor delineation between undersized[d] pedestrian walks and transit causes near misses between pedestrians and transit vehicles	Delineation between pedestrians and transit	Options for delineation between pedestrian and transit areas: Retain existing 4-inch curb; Install higher curb between walks and transit; Barrier or bollards between walks and transit; Shift pedestrian walks adjacent to storefronts; Install trees, lights, and other furnishings between walks and transit; Provide visual and/or tactile difference in materials between walks and transit; Use technology to delineate walks and transit, such as colored lights.	Same options for delineation between pedestrian and transit areas as Granite Pavers option.	Different materials visually delineate pedestrian and transit areas. Same options for delineation between pedestrian and transit areas as Granite Pavers option.	Different materials visually delineate pedestrian and transit areas. Same options for delineation between pedestrian and transit areas as Granite Pavers option.	Different materials visually delineate pedestrian and transit areas. Same options for delineation between pedestrian and transit areas as Granite Pavers option.

Category	Criteria	Granite pavers with a mortar setting (full width of Mall)	Unit pavers with a sand setting (full width of Mall)	Precast concrete slabs w/pattern, color (transit); granite pavers (walks)	Cast-in-place concrete option A[a], no pattern, color (transit); granite pavers (walks)	Cast-in-place concrete option B[a], no pattern, color (transit); granite pavers (walks)
Slick pavement surface causes pedestrian slips and falls, and bus traction problems; this is compounded by snowy or icy conditions in winter	Pavement surface reduces "slip, trip and fall" risks	The existing granite pavers have a Thermal finish. Other finishes have a greater coefficient of friction than the existing surface. In addition, grooves and additional texture can be added in key areas to increase traction for buses.	Multiple finishes and textures are available from concrete, clay, or stone pavers, all of which have a greater coefficient of friction than the existing surface. In addition, grooves and additional texture can be added in key areas to increase traction for buses.	In the transit ways, multiple finishes and textures are available with precast concrete, that all have a greater coefficient of friction than the existing surface. In addition, grooves and additional texture can be added in key areas to increase traction for buses. Pavers in the pedestrian areas would use a finish with a greater coefficient of friction than the existing surface.	In the transit ways, concrete finish has a greater coefficient of friction than the existing surface. In addition, grooves and additional texture can be added in key areas while finishing the concrete surface to increase traction for buses. Pavers in the pedestrian areas would use a finish with a greater coefficient of friction than the existing surface.	In the transit ways, concrete finish has a greater coefficient of friction than the existing surface. In addition, grooves and additional texture can be added in key areas while finishing the concrete surface to increase traction for buses. Pavers in the pedestrian areas would use a finish with a greater coefficient of friction than the existing surface.
Transit mobility and operations						
Frequent maintenance disrupts transit operations, and would be more disruptive as ridership increases	Maintenance effects on bus operations efficiency and requirements	Frequency of pavement maintenance substantially reduced from current conditions. Portions of mortar in joints must be replaced as part of routine maintenance.	Frequency of pavement maintenance substantially reduced from current conditions. Small amounts of sand wash out of joints and require additional sand to be added as part of routine maintenance.	Frequency of pavement maintenance substantially reduced from current conditions. Routine maintenance includes repairing and sealing cracks and spalling. Periodic maintenance, for example, concrete panel replacement, required every 5 to 10 years would affect bus operations. Reconstruction of pavement system likely to occur once in 40-year lifespan, substantially disrupting bus operations during construction.	Frequency of pavement maintenance substantially reduced from current conditions. Routine maintenance includes repairing and sealing cracks and spalling. Reconstruction of pavement system likely to occur two times in 40-year lifespan, substantially disrupting bus operations during construction.	Frequency of pavement maintenance substantially reduced from current conditions. Routine maintenance includes repairing and sealing cracks and spalling. Periodic maintenance, for example, concrete removal and overlay, required every 5 to 10 years would affect bus operations. No future reconstruction needed.
During construction the efficiency of transit operations would be dramatically reduced	Minimum disruption during construction	Longer construction disruption on 16th Street than concrete; similar construction duration to unit pavers.	Longer construction disruption on 16th Street than concrete; similar construction duration to granite pavers.	Shortest construction disruption on 16th Street, as concrete panels are poured and formed offsite.	Shorter construction disruption on 16th Street than pavers; slightly longer disruption than precast concrete.	Shorter construction disruption on 16th Street than pavers; slightly longer disruption than precast concrete.

Category	Criteria	Granite pavers with a mortar setting (full width of Mall)	Unit pavers with a sand setting (full width of Mall)	Precast concrete slabs w/pattern, color (transit); granite pavers (walks)	Cast-in-place concrete option A[a], no pattern, color (transit); granite pavers (walks)	Cast-in-place concrete option B[a], no pattern, color (transit); granite pavers (walks)
Community and Environment						
Construction impacts	Construction impacts	Longer construction disruption on 16th Street than concrete; similar construction duration to unit pavers.	Longer construction disruption on 16th Street than concrete; similar construction duration to granite pavers.	Shortest construction disruption on 16th Street, as concrete panels are poured and formed offsite.	Shorter construction disruption on 16th Street than pavers; slightly longer disruption than precast concrete.	Shorter construction disruption on 16th Street than pavers; slightly longer disruption than precast concrete.
Environmental impacts	Historic resources impacts	Most consistent with existing design and pattern. Granite pavers can be installed with similar size, color and pattern, with changes to the finish to reduce slips and falls.	Smaller unit pavers can be similar color and overall pattern as existing. Smaller paver sizes would impact pattern of jointing.	Can be produced to match the overall pattern. Slight color change and texture change may occur with granite pavers at pedestrian areas.	Replicating pattern may be cost prohibitive and technically difficult. This would require multiple separate concrete pours and consistency of coloring that may be difficult. Precision of jointing pattern would be difficult to achieve.	Replicating pattern may be cost prohibitive and technically difficult. This would require multiple separate concrete pours and consistency of coloring that may be difficult. Precision of jointing pattern would be difficult to achieve.
Public and agency support	Level of Agency Support	Granite pavers for the surface treatment are supported to a much higher degree by CCD than concrete.	RTD does not support unit pavers in the transit ways.	RTD supports concrete, especially for the transit guideway.	RTD supports concrete, especially for the transit guideway.	RTD supports concrete, especially for the transit guideway.

[a] Cast-in-place Concrete Option A comprises standard concrete construction, with routine maintenance and two replacements during the 40-year lifespan. Cast-in-place Concrete Option B comprises a thicker concrete slab, and would not need replacement during the 40-year lifespan with routine maintenance.

Table 6-4. Curb Options

Category	Criteria	Vertical Curb	Flat Pan	Hybrid
Infrastructure	Utilities	Impacts to utilities would be the same under all curb options because the level of excavation during construction activities would be the same.		
Infrastructure	Drainage	Design features for drainage would be the same for all curb options. The drainage flowline and inlets would move to the new edge of transit way, and surface runoff would drain into new inlets contained within the 2-foot-wide linear vertical curb or pan strip. Under any of the curb options, some areas of the Mall could be designed with supplemental drainage to remain in its existing location, and surface runoff would drain into or in line with the proposed tree wells.		
Infrastructure	Maintenance	Existing transit way maintenance is most frequent along the drainage flow lines because water gathers along the flow lines and seeps into the sub-base more frequently in these locations, which correspond with the wheel loads of the Free MallRide shuttles. The new pavement system would address this problem in the same manner for all curb options by allowing water to drain into the storm sewer system after it penetrates the surface pavers. Maintenance activities in the transit way would require closure of one lane of transit during the maintenance period. No difference in other maintenance activities (examples: snow removal, drainage inlets, granite maintenance).		

Category	Criteria	Vertical Curb	Flat Pan	Hybrid
Safety	Pedestrians, including ADA Community	Separation of pedestrian walkways from transit way by an amenity zone would increase safety and be consistent with guidance (FHWA, 2013 and 2017; NACTO, 2013 and 2016; RTD, 2016a). Vertical curbs are the traditional means of delineating pedestrian areas from vehicular areas for visually impaired users, although this curb would be undersized and blend in with the surrounding pattern, negating its use as a visual delineation. Additionally, tactile walking surface indicators and detectable edges, consisting of texture changes in the pavement, would delineate the pedestrian walkway from the amenity zone and the amenity zone from the transit way, to assist visually impaired users in wayfinding, consistent with guidance (FHWA, 2017). Vertical curbs create a tripping hazard for pedestrians, particularly during large public events when transit is moved off the Mall to create a pedestrian-only environment. New pavers with increased friction to prevent slips and falls. Fixed furnishings to provide physical barrier against errant vehicles.	Separation of pedestrian walkways from transit way by an amenity zone would increase safety and be consistent with guidance (FHWA, 2013 and 2017; NACTO, 2013 and 2016; RTD, 2016a). No vertical curb to alert visually impaired users to edge of transit way location. Tactile walking surface indicators and detectable edges, consisting of textures changes in the pavement, would delineate the pedestrian walkway from the amenity zone and the amenity zone from the transit way, to assist visually impaired users in wayfinding, consistent with guidance (FHWA, 2017). The pan option reduces tripping hazard for pedestrians. New pavers with increased friction to prevent slips and falls. Fixed furnishings to provide physical barrier against errant vehicles.	Separation of pedestrian walkways from transit way by an amenity zone would increase safety and be consistent with guidance (FHWA, 2013 and 2017; NACTO, 2013 and 2016; RTD, 2016a). Design comprises a vertical curb at designated shuttle stops and cross streets and a pan for the rest of each block (as described in vertical curb and pan columns).

Category	Criteria	Vertical Curb	Flat Pan	Hybrid
Safety (continued)	Transit Shuttle Operation	Vertical curbs provide a small physical barrier to contain Free MallRide shuttles in the transit way if they slip on the pavement during inclement weather. New pavers with increased friction to prevent bus sliding during inclement weather.	The pan design option maintains linear elements of pattern at the edge of transit way. New pavers with increased friction to prevent bus sliding during inclement weather.	Vertical curbs at designated shuttle stops provide a small physical barrier to contain Free MallRide shuttles in the transit way if they slip on the pavement during inclement weather. New pavers with increased friction to prevent bus sliding during inclement weather.
Mobility	Pedestrians, including ADA Community	Wheelchair users can only cross the transit way at the ends of blocks and at alleys. Visually impaired users will have both the curb and tactile walking-surface indicators and detectable edges, consisting of texture changes in the pavement, to guide them.	Wheelchair users can cross the transit way anywhere, not just at the ends of blocks and at alleys. Visually impaired users will have tactile walking-surface indicators and detectable edges, consisting of texture changes in the pavement, to guide them.	Wheelchair users can cross the transit way almost anywhere, not just at the ends of blocks and at alleys. Visually impaired users will have tactile walking-surface indicators and detectable edges, consisting of texture changes in the pavement, to guide them.

Category	Criteria	Vertical Curb	Flat Pan	Hybrid
Mobility (continued)	Transit Shuttle Operation	Vertical curb provides visual and physical guidance for bus drivers. Adjacent furnishings in the amenity zone create another vertical edge to provide visual guidance for bus drivers. Shuttles can use curbs to gain traction during slippery conditions. New pavers with increased friction prevent bus sliding during inclement weather.	The pan option maintains linear elements of pattern at the edge of the transit way to visually delineate the transit way. Adjacent furnishings in the amenity zone create a vertical edge to provide visual guidance for bus drivers. New pavers with increased friction to prevent bus sliding during inclement weather.	Vertical curb provides visual and physical guidance for bus drivers at designated shuttle stops. The pan maintains linear elements of pattern at the edge of the transit way to visually delineate the transit way. Adjacent furnishings in the amenity zone create a vertical edge to provide visual guidance for bus drivers. Shuttles can use curbs to gain traction during slippery conditions at designated shuttle stops where they stop and start. New pavers with increased friction prevent bus sliding during inclement weather.

Category	Criteria	Vertical Curb	Flat Pan	Hybrid
Mobility (continued)	Boarding and Alighting Transit Shuttles	Shuttle boarding and alighting can occur anywhere on the curb on the Mall, but generally occurs at clearly delineated shuttle stops. Same height to step on and off the shuttle as existing conditions.	Shuttle boarding and alighting can occur anywhere on the Mall, but generally occurs at clearly delineated shuttle stops. No curb or platform to step on and off the shuttle. The steps will be 14 inches from the Mall's surface under normal driving height 11.25 inches when the bus is kneeling, compared to 10 inches under current conditions for normal driving height and 7.25 inches when kneeling. If the bus needs to kneel to the special needs of a passenger with a disability, a short delay would occur; the bus requires 3 seconds to kneel and another 3 seconds to come back up to driving height.	Shuttle boarding and alighting can occur anywhere on the Mall, but generally occurs at clearly delineated shuttle stops. Same height to step on and off the shuttle as existing conditions at designated shuttle stops.
Public Use	Flexibility of space for public use	Provides a less flexible space for current and future public use than the other curb options, with a vertical curb separating the spaces within the Mall and preventing the flexibility during special events that a flat surface with no curb would provide.	Provides a more flexible space for current and future public use than the vertical curb option, with a flat surface across the width of the Mall for pedestrian use during public events that temporarily close the Mall to transit service and other vehicles.	Provides a more flexible space for current and future public use than the vertical curb option, with a flat surface across the width of the Mall for pedestrian use during public events that temporarily close the Mall to transit service and other vehicles.

Category	Criteria	Vertical Curb	Flat Pan	Hybrid
	Adaptability of space to future public use/needs	Use of transit way is restricted to transit use between the curbs.	More adaptable space for changed future conditions related to transit technology, entertainment, and public amenities. Corridors without vertical curbs can be viewed by the public as having a unique setting and as a more interesting public space, compared to corridors with a vertical curb, with the potential to attract more people to the space (DVRPC, 2018). Additional users on the Mall can translate to additional revenue from transit service to and from the Mall.	More adaptable space for changed future conditions related to transit technology, entertainment, and public amenities. Corridors without vertical curbs can be viewed by the public as having a unique setting and as a more interesting public space, compared to corridors with a vertical curb, with the potential to attract more people to the space (DVRPC, 2018). Additional users on the Mall can translate to additional revenue from transit service to and from the Mall.
Impact to the 16th Street Historic Property	Pavement pattern	The vertical curb would be located within a linear 2-foot strip of curb that would mimic the existing pavement pattern.	The pan would be located within a linear 2-foot strip of curb that would mimic the existing pavement pattern. This pan would be in the exact same location on the center-running bocks as the current pan between the transit ways and the median.	The vertical curb and pan would be located within a linear 2-foot strip of curb that would mimic the existing pavement pattern. This pan would be in the exact same location on the center-running bocks as the current pan between the transit ways and the median.

Category	Criteria	Vertical Curb	Flat Pan	Hybrid
	Granite Special Units (curbs, cuts, drains)	The vertical curb mimics the existing curbs that are on the outer edges of the existing transit ways. Stormwater collection would occur at the edge of the realigned transit way. Inlet covers would be designed to mimic materials, pattern and color, as applicable.	The pan mimics the existing pan on the inner edges of the existing transit ways by the median. Stormwater collection would occur at the edge of the realigned transit way. Inlet covers would be designed to mimic materials, pattern and color, as applicable.	The vertical curb and pan mimic the existing curbs and pan on the edges of the existing transit way. Stormwater collection would occur at the edge of the realigned transit way. Inlet covers would be designed to mimic materials, pattern and color, as applicable.
	New Edge Delineations	The following are new edge delineations common to all curb option concepts: • Truncated domes at designated crossings • Truncated domes at designated shuttle stops • Optional directional indicator • Amenity zone with fixed furnishings • Textured delineation between the transit way and amenity zone		

Table 6-5. LPA Design Options

Category	Criteria	LPA: Center Running and New Asymmetrical Alternative	LPA Design Option 1: Reduced narrow side amenity zone	LPA Design Option 2: Reduced narrow side patio space
Economics and Cost				
Failing pavement system in constant need of repair	Capital cost (millions)	$114 (range based on market fluctuation: $97 to $137)	Not a discriminator: Comparable to the proposed LPA	Not a discriminator: Comparable to the proposed LPA
	Annual transit way and sidewalk maintenance cost	$309,000	Not a discriminator: Comparable to the proposed LPA	Not a discriminator: Comparable to the proposed LPA

Category	Criteria	LPA: Center Running and New Asymmetrical Alternative	LPA Design Option 1: Reduced narrow side amenity zone	LPA Design Option 2: Reduced narrow side patio space
	Future transit way replacement cost	$0	Not a discriminator: Comparable to the proposed LPA	Not a discriminator: Comparable to the proposed LPA
	40-year investment	$126.4 (range based on market fluctuation: $107 to $152)	Not a discriminator: Comparable to the proposed LPA	Not a discriminator: Comparable to the proposed LPA
Outdated infrastructure does not meet current ADA requirements and leads to poor tree health; lack of water quality treatment and modern fiber optic and communications utilities doesn't meet modern-day needs	Ability to address ADA deficiencies[a]	Not a discriminator: Can address ADA deficiencies	Not a discriminator: Can address ADA deficiencies	Not a discriminator: Can address ADA deficiencies
	Tree infrastructure is updated to modern standards.	Not a discriminator: Installs modern tree infrastructure and new trees; conflicting utilities would be relocated.	Not a discriminator: Installs modern tree infrastructure and new trees; conflicting utilities would be relocated.	Not a discriminator: Installs modern tree infrastructure and new trees; conflicting utilities would be relocated.
	Water quality treatment is added to stormwater drainage system.	Not a discriminator: Installs stormwater quality treatment facilities, meeting City standards.	Not a discriminator: Installs stormwater quality treatment facilities, meeting City standards.	Not a discriminator: Installs stormwater quality treatment facilities, meeting City standards.
	Add fiber optic utility infrastructure and update/increase electric utility capabilities.	Not a discriminator: Installs new fiber optic and upgraded electric utilities conduit.	Not a discriminator: Installs new fiber optic and upgraded electric utilities conduit.	Not a discriminator: Installs new fiber optic and upgraded electric utilities conduit.
Safety and Security				
Poor delineation between undersized[b] pedestrian walks and transit causes near misses between	Pedestrian overflow into transit ways	Not a discriminator: Center-running blocks: 10-foot-minimum pedestrian walks accommodate	Not a discriminator: Center-running blocks: 10-foot-minimum pedestrian walks accommodate	Not a discriminator: Center-running blocks: 10-foot-minimum pedestrian walks accommodate

Category	Criteria	LPA: Center Running and New Asymmetrical Alternative	LPA Design Option 1: Reduced narrow side amenity zone	LPA Design Option 2: Reduced narrow side patio space
pedestrians and transit vehicles		pedestrians without overflow into transit ways. New Asymmetrical blocks: 10-foot walkways on asymmetrical blocks accommodate pedestrians without overflow into transit ways.	pedestrians without overflow into transit ways. New Asymmetrical blocks: 10-foot walkways on asymmetrical blocks accommodate pedestrians without overflow into transit ways.	pedestrians without overflow into transit ways. New Asymmetrical blocks: 10-foot walkways on asymmetrical blocks accommodate pedestrians without overflow into transit ways.
	Delineation between pedestrians and transit	Center-running blocks: Pedestrian walks separated by amenity zones as recommended by guidance[c]. New Asymmetrical blocks: Pedestrian walks separated by amenity zones as recommended by guidance[c].	Center Running Blocks: Pedestrian walks separated and delineated by amenity zones as recommended by guidance[c]. Proposed Asymmetrical: Pedestrian walks on wide side of block are separated by amenity zones as recommended by guidance[c]. Pedestrian walks on narrow side of block physically separated from the transit way by a 3-foot buffer. The buffer is not wide enough to act as an amenity zone for multiuse fixed furnishings, lights, or a row of trees, which could provide delineation between the	Center-running blocks: Pedestrian walks separated by amenity zones as recommended by guidance[c]. New Asymmetrical blocks: Pedestrian walks separated by amenity zones as recommended by guidance[c].

Category	Criteria	LPA: Center Running and New Asymmetrical Alternative	LPA Design Option 1: Reduced narrow side amenity zone	LPA Design Option 2: Reduced narrow side patio space
			pedestrian walkway and transit way. A row of vertical bollards would provide safe separation and delineation of the pedestrian walkway from transit way.	
Slick pavement surface causes pedestrian slips and falls, bus traction problems, compounded by snowy or icy conditions in winter	Pavement surface reduces "slip, trip and fall" risks	Not a discriminator: Comprised of granite pavers with a higher friction finish.	Not a discriminator: Comprised of granite pavers with a higher friction finish.	Not a discriminator: Comprised of granite pavers with a higher friction finish.
Safety and security systems should be upgraded to current standards.	Ability to accommodate future technology for security best practices	Not a discriminator: Installs new fiber optic and upgraded electric utilities conduit.	Not a discriminator: Installs new fiber optic and upgraded electric utilities conduit.	Not a discriminator: Installs new fiber optic and upgraded electric utilities conduit.

Category	Criteria	LPA: Center Running and New Asymmetrical Alternative	LPA Design Option 1: Reduced narrow side amenity zone	LPA Design Option 2: Reduced narrow side patio space
Transit mobility and operations				
Frequent maintenance disrupts transit operations, and would be more disruptive as ridership increases	Maintenance effects on bus operations efficiency and requirements	Not a discriminator: Frequency of pavement maintenance impacts on bus operations substantially reduced from current conditions.	Not a discriminator: Frequency of pavement maintenance impacts on bus operations substantially reduced from current conditions.	Not a discriminator: Frequency of pavement maintenance impacts on bus operations substantially reduced from current conditions.
The demand for transit services is projected to increase to 70,000 riders/day in 2035	Provision of connectivity between DUS and CCS, and crossing bus and light rail routes in between	Not a discriminator: Maintains existing connections. Service expansion options comprise operating buses in tandem or procuring larger buses.	Not a discriminator: Maintains existing connections. Service expansion options comprise operating buses in tandem or procuring larger buses.	Not a discriminator: Maintains existing connections. Service expansion options comprise operating buses in tandem or procuring larger buses.
	Accommodation of tandem and/or larger buses at bus stops	Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (trees, lights) prevent bus boarding.	Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (bollards, trees, lights) prevent bus boarding.	Not a discriminator: Accommodates tandem and/or larger buses; no permanent elements (trees, lights) prevent bus boarding.
Transit operations would become increasingly difficult as the volume of passengers and pedestrian use increases on the Mall	Effect on transit operations	Bus drivers need to protect only the curb side of the bus.	Bus drivers need to protect only the curb side of the bus. The 3-foot amenity zone on narrow side of asymmetrical blocks allows less space for	Bus drivers need to protect only the curb side of the bus.

Category	Criteria	LPA: Center Running and New Asymmetrical Alternative	LPA Design Option 1: Reduced narrow side amenity zone	LPA Design Option 2: Reduced narrow side patio space
			transit users waiting at designated shuttle stops; may force transit users into the pedestrian walkway.	
During construction the efficiency of transit operations would be dramatically reduced	Minimum disruption during construction	Not a discriminator: Major impact during the construction period.	Not a discriminator: Major impact during the construction period.	Not a discriminator: Major impact during the construction period.

Category	Criteria	LPA: Center Running and New Asymmetrical Alternative	LPA Design Option 1: Reduced narrow side amenity zone	LPA Design Option 2: Reduced narrow side patio space
Pedestrian mobility				
Sidewalks are undersized for pedestrian volumes[d] and CCD standards (10-foot sidewalks downtown)[e].	Pedestrian volumes and accessibility guidelines are accommodated	Center-running blocks: Pedestrian volumes and CCD standards are accommodated - 2,400 pedestrians/hour on 10-foot sidewalks next to patio/gathering space, with additional space for pedestrians, shuttle stops, and/or amenities. New Asymmetrical blocks: Pedestrian volumes and CCD standards are accommodated - 2,400 pedestrians/hour on 10-foot sidewalks next to patio/gathering space, with additional space for shuttle stops and amenity zone.	Center-running blocks: Pedestrian volumes and CCD standards are accommodated - 2,400 pedestrians/hour on 10-foot sidewalks next to patio/gathering space, with additional space for pedestrians, shuttle stops, and/or amenities. Proposed New Asymmetrical blocks: Pedestrian volumes and CCD standards are accommodated except at bus stops - 2,400 pedestrians/hour on 10-foot sidewalks. The narrow 3-foot buffer between the pedestrian walkway and transit way does not provide adequate space at bus stops, resulting in more bus passengers standing in the pedestrian walkway at bus stops, reducing sidewalk capacity and	Center-running blocks: Pedestrian volumes and CCD standards are accommodated - 2,400 pedestrians/hour on 10-foot sidewalks next to patio/gathering space, with additional space for pedestrians, shuttle stops, and/or amenities. Proposed New Asymmetrical blocks: Pedestrian volumes and CCD standards are accommodated - 2,400 pedestrians/hour on 10-foot sidewalks next to patio/gathering space, with additional space for shuttle stops and amenity zone.

Category	Criteria	LPA: Center Running and New Asymmetrical Alternative	LPA Design Option 1: Reduced narrow side amenity zone	LPA Design Option 2: Reduced narrow side patio space
			hindering pedestrian mobility. The introduction of vertical bollards reduces pedestrian permeability across the Mall.	

Category	Criteria	LPA: Center Running and New Asymmetrical Alternative	LPA Design Option 1: Reduced narrow side amenity zone	LPA Design Option 2: Reduced narrow side patio space
Public Use Functionality				
Limited usability of divided public space on median blocks and narrow sides of asymmetrical blocks to accommodate patio/gathering space[f] and pedestrian needs.	Width for patio and gathering space	Center-running Blocks: Walkways on both sides of blocks are wide enough for 9-foot patio/gathering space and 10-foot pedestrian walk, with additional space for amenity zone. New Asymmetrical Blocks: Walkways on both sides of asymmetrical blocks are wide enough to accommodate 9-foot patio/gathering space and 10-foot pedestrian walk, with additional space for amenity zone.	Center-running Blocks: Walkways on both sides of blocks are wide enough for 9-foot patio/gathering space and 10-foot pedestrian walk, with additional space for amenity zone. Proposed New Asymmetrical Blocks: Walkways on both sides of asymmetrical blocks are wide enough to accommodate 9-foot patio/gathering space and 10-foot pedestrian walk, with limited space for an undersized amenity zone.	Center-running Blocks: Walkways on both sides of blocks are wide enough for 9-foot patio/gathering space and 10-foot pedestrian walk, with additional space for amenity zone. Proposed New Asymmetrical Blocks: Walkways on the wide side of asymmetrical blocks are wide enough to accommodate 9-foot patio/gathering space and 10-foot pedestrian walk, with additional space for amenity zone. Walkways on the narrow side asymmetrical blocks not wide enough to accommodate a 10-foot pedestrian walk, a 5-foot amenity zone, and a 9-foot patio/gathering area. Patio/gathering area would be 7 feet. Reducing the patio space by 2 feet

Category	Criteria	LPA: Center Running and New Asymmetrical Alternative	LPA Design Option 1: Reduced narrow side amenity zone	LPA Design Option 2: Reduced narrow side patio space
				reduces the seating capacity by one-third, resulting in less public activation; patio space has been demonstrated to be the most activating space for public use. Maintains an inequity in the public use of the asymmetrical blocks, with the narrow side continuing to have less capacity for public use and be less desirable.

Category	Criteria	LPA: Center Running and New Asymmetrical Alternative	LPA Design Option 1: Reduced narrow side amenity zone	LPA Design Option 2: Reduced narrow side patio space
Negative perception of safety and lack of natural surveillance inhibits positive public use of Mall.	Adherence to best practices for natural surveillance, activation, and positive public use of pedestrian and gathering areas.	Center-running Blocks: Replaces public space in medians with consolidated public space adjacent to buildings, increasing natural surveillance and adhering to safety and security best practices. New Asymmetrical Blocks: Increases opportunities for positive public use and activities on the Mall, increasing natural surveillance and adhering to safety and security best practices.	Center-running Blocks: Replaces public space in medians with consolidated public space adjacent to buildings, increasing natural surveillance and adhering to safety and security best practices. New Asymmetrical Blocks: Does not increase opportunities for positive public use and activities on the Mall. Natural surveillance on the Mall would be approximately the same as under existing conditions.	Center-running Blocks: Replaces public space in medians with consolidated public space adjacent to buildings, increasing natural surveillance and adhering to safety and security best practices. New Asymmetrical Blocks: Reducing patio space reduces the primary generator of public activity on the Mall by one-third, resulting in a small reduction of natural surveillance activity.
Community and Environment				
Construction impacts	Construction impacts	Not a discriminator: Major impact during the construction period.	Not a discriminator: Major impact during the construction period.	Not a discriminator: Major impact during the construction period.

Category	Criteria	LPA: Center Running and New Asymmetrical Alternative	LPA Design Option 1: Reduced narrow side amenity zone	LPA Design Option 2: Reduced narrow side patio space
Environmental impacts	Historic resources impacts	Center-running Blocks: Replaces median blocks. Ability to accommodate existing pavement pattern, with minor adjustments. Maintains blocks as symmetrical. New Asymmetrical Blocks: Modify historic design; can accommodate existing pavement pattern and spatial relationships, with some adjustments. Maintains blocks as asymmetrical Relationship of the end "rooms" to the overall design: Maintains three rooms with the same transition locations and linear dimensions of the existing rooms; maintains the setting of the rooms with the historic core in center running/median blocks; maintains the viewshed of the capital and clock tower with the room	Center-running Blocks: Replaces median blocks. Ability to accommodate existing pavement pattern, with minor adjustments. Maintains blocks as symmetrical. New Asymmetrical Blocks: Rebuild wide side of block from edge of right of way to edge of transit way with pattern, trees, and lights in existing locations; modify historic design for remainder of cross section; modifications can accommodate existing pavement pattern and spatial relationships, with some adjustments on the narrow side. Relationship of the end "rooms" to the overall design: Maintains three rooms but changes the transition location and number of blocks (linear proportion) of the rooms; changes the sizes of the rooms and the locations of	Center-running Blocks: Replaces median blocks. Ability to accommodate existing pavement pattern, with minor adjustments. Maintains blocks as symmetrical. New Asymmetrical Blocks: Rebuild wide side of block from edge of right of way to edge of transit way with pattern, trees, and lights in existing locations; modify historic design for remainder of cross section; modifications can accommodate existing pavement pattern and spatial relationships, with some adjustments on the narrow side. Relationship of the end "rooms" to the overall design: Maintains three rooms but changes the transition location and number of blocks (linear proportion) of the rooms; changes the sizes of the rooms and the locations of

Category	Criteria	LPA: Center Running and New Asymmetrical Alternative	LPA Design Option 1: Reduced narrow side amenity zone	LPA Design Option 2: Reduced narrow side patio space
		transitions in the same locations.	the transitions between the center and end rooms, resulting in change in setting and continuity of the relationship between the median (reconstructed as center running) and asymmetrical blocks; also makes substantial change to the physical aspects of the linear design.	the transitions between the center and end rooms, resulting in change in setting and continuity of the relationship between the median (reconstructed as center running) and asymmetrical blocks; also makes substantial change to the physical aspects of the linear design.

Category	Criteria	LPA: Center Running and New Asymmetrical Alternative	LPA Design Option 1: Reduced narrow side amenity zone	LPA Design Option 2: Reduced narrow side patio space
Environmental impacts (continued)	Socioeconomic impacts	Potential benefits to social, economic, and land use resources because of higher public use and perception of safety. Center-running blocks provide equitable distribution of pedestrian space and public amenities, including tree canopy and gathering space, providing benefits for economic vitality of businesses on both sides of the Mall. Asymmetrical blocks provide trees, additional public amenity space, and a 9-foot patio/gathering space on the narrow side of the block, making business locations on the narrow side of the block more desirable than the design options.	Center-running blocks provide equitable distribution of pedestrian space and public amenities, including tree canopy and gathering space, providing benefits for economic vitality of businesses on both sides of the Mall. Does not provide space for trees or lighting to improve the public use conditions on the narrow side of asymmetrical blocks, perpetuating inequitable distribution of public space and resulting in a less desirable business location than the wide side of the blocks and disproportionate impacts to those property owners and businesses. Would require bollards or other vertical separation between transitway and pedestrian walkway, which introduces undesirable visual elements and physical barriers to pedestrian	Center-running blocks provide equitable distribution of pedestrian space and public amenities, including tree canopy and gathering space, providing benefits for economic vitality of businesses on both sides of the Mall. Lesser public use on the narrow side of the asymmetrical blocks impacts businesses and property owners: reduced patio zones remove 30 percent of outdoor table seating and reduce public activation on these blocks, resulting in a less desirable business location than the wide side of the blocks and disproportionate impacts to those property owners and businesses. For visual resources, views to the tower and capital are changed, and the row of trees along the length of the Mall cannot be maintained.

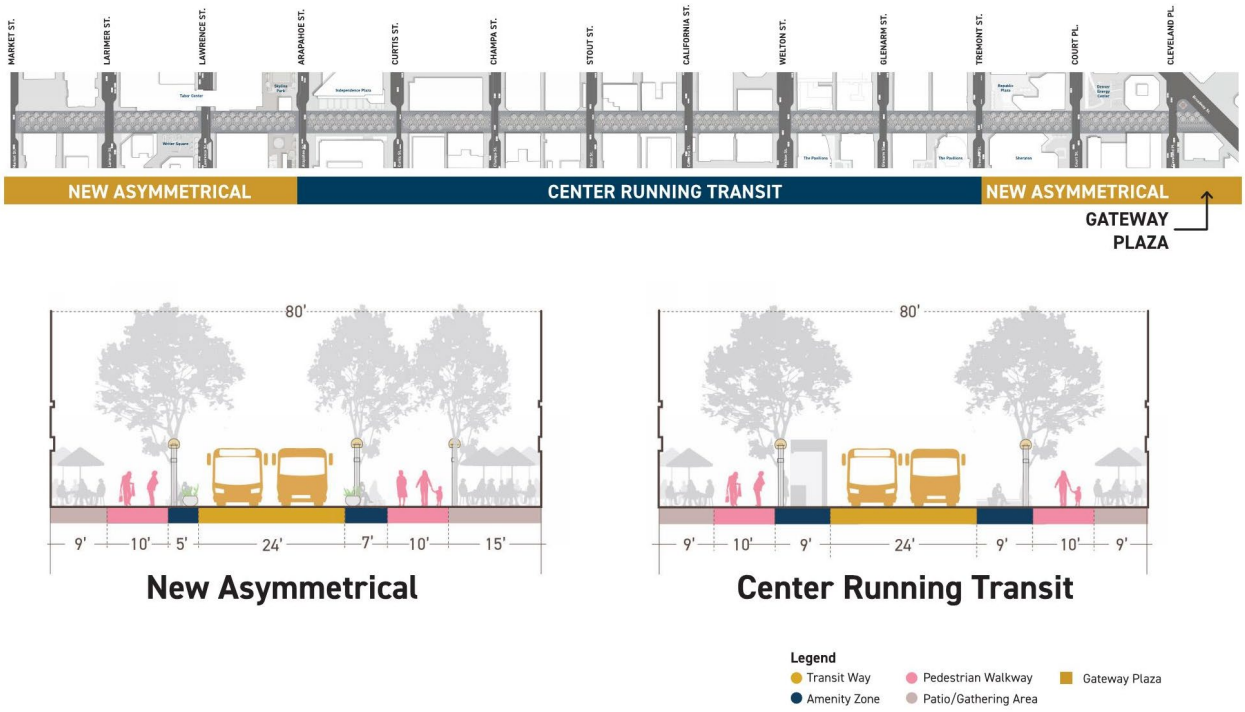
Category	Criteria	LPA: Center Running and New Asymmetrical Alternative	LPA Design Option 1: Reduced narrow side amenity zone	LPA Design Option 2: Reduced narrow side patio space
			permeability and flow across the Mall. For visual resources, views to the tower and capital are changed, and the row of trees along the length of the Mall cannot be maintained.	
	Natural resources impacts	Not a discriminator: Replaces 400,000 square feet of hardscape, installs water quality treatment (benefit to water quality). No changes to other resources.	Not a discriminator: Replaces 400,000 square feet of hardscape, installs water quality treatment (benefit to water quality). No changes to other resources.	Not a discriminator: Replaces 400,000 square feet of hardscape, installs water quality treatment (benefit to water quality). No changes to other resources.

Category	Criteria	LPA: Center Running and New Asymmetrical Alternative	LPA Design Option 1: Reduced narrow side amenity zone	LPA Design Option 2: Reduced narrow side patio space
Ability to meet the Project Purpose and Need	Satisfies the Project Purpose and Need	Ranks first in fulfillment of the Purpose and Need. Replaces failing infrastructure. Improves pedestrian safety and mobility through wider sidewalks and separation of pedestrian walkway from transit way. Supports future transit mobility. Meets requirements for adequate patio/gathering, sidewalk, and amenity space. Adheres to best practices for natural surveillance and public activation.	Ranks third in fulfillment of the Purpose and Need. Replaces failing infrastructure. Improves pedestrian safety and mobility through wider sidewalks and separation of pedestrian walkway from transit way; separation of pedestrian walkway from transit way on narrow side of asymmetrical blocks is narrow and requires vertical bollards for safe delineation. Supports future transit mobility. Does not meet requirements for adequate patio/gathering, sidewalk, and amenity space. Adheres to best practices for natural surveillance and public activation.	Ranks second in fulfillment of the Purpose and Need. Replaces failing infrastructure. Improves pedestrian safety and mobility through wider sidewalks and separation of pedestrian walkway from transit way. Supports future transit mobility. Does not meet requirements for adequate patio/gathering, sidewalk, and amenity space. Adheres to best practices for natural surveillance and public activation.
Disposition		Carry forward	Do not carry forward	Carry forward

7. Locally Preferred Alternative

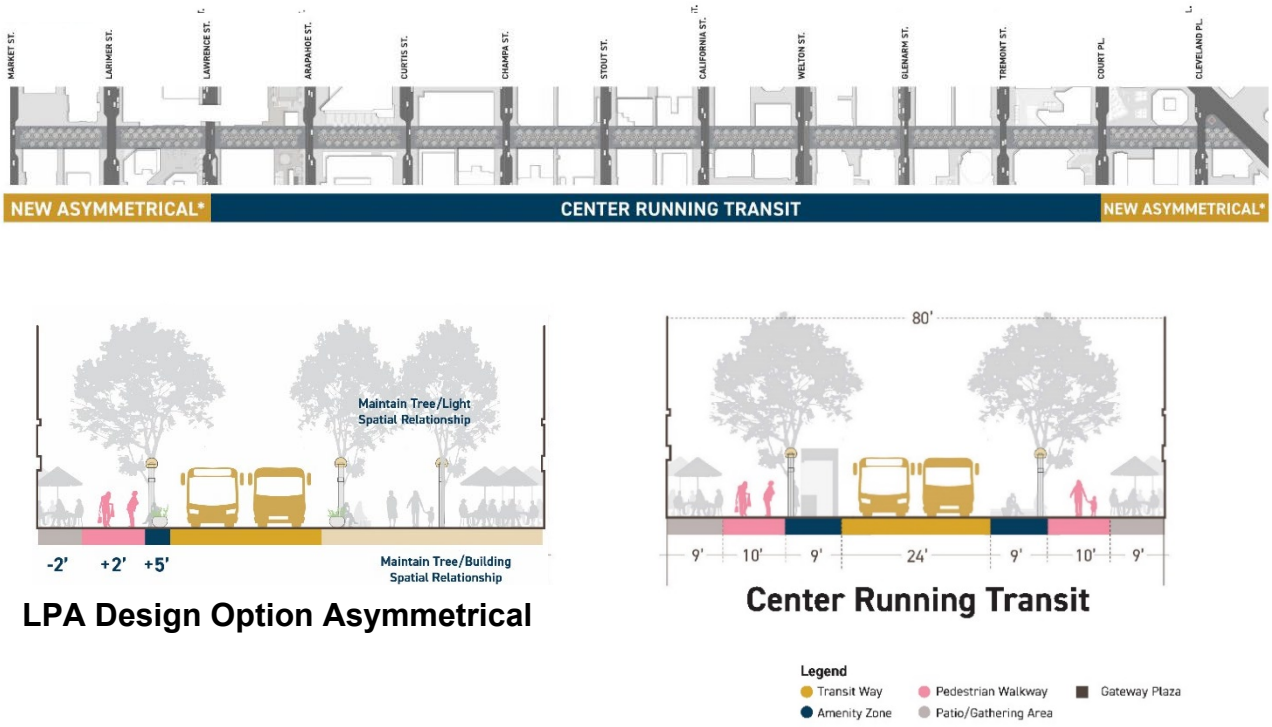
This section describes the LPA, including capital improvements, transit operations, traffic operations, and construction activities. **Figure 7-1** illustrates the proposed alignments and delineates sidewalks and the transit way within the proposed alignments. Figure 7-2 illustrates a LPA Design Option, which extends the center running transit design for two extra blocks and rebuilds the wide side of the remaining asymmetrical blocks in place.

Figure 7-1. Locally Preferred Alternative



*Note: Under the LPA Design Option the Gateway Plaza configuration (**Figure 5-2**) would be implemented between Cleveland Place and Broadway.*

Figure 7-2. Locally Preferred Alternative Design Option



*Note: Under the LPA the Gateway Plaza configuration (**Figure 5-2**) would be implemented between Cleveland Place and Broadway.*

A. Capital Improvements

This section describes the capital improvements that will comprise the LPA and the LPA Design Option. The LPA and LPA Design Option differ only in alignments, transitions, and pattern on the asymmetrical blocks. Accordingly, the LPA Design Option is discussed only in **Sections 7.A.1** and **7.A.2**.

1. Alignments and Transitions

The primary differences between the LPA and the LPA Design Option are the alignments and transitions of the asymmetrical and center running blocks.

a) LPA

The western Project limits would be the eastern edge of the 16th Street and Market Street intersection. From Market Street to Arapahoe Street the alignment would be the new asymmetrical cross-section design (**Figure 7-1**). The new asymmetrical cross-section design removes the existing 6-foot median with light fixtures from between the transit way lanes, pushes the existing two transit way lanes together into a single transit way comprising two adjacent 12-foot transit ways, and increases the size of the pedestrian area on the narrow side of the cross-section from 17 to 24 feet. and reduces the pedestrian area on the wide side of the cross section from 33 feet to 32 feet.

The LPA would shift the location of the pavement pattern, trees, and lights 2 feet north on the wide side of the block, reducing the space between the buildings and first row of trees and lights by 2 feet. The LPA would add 1 foot of usable space to the amenity zone to reduce the amount of bus mirror overhang at the edge of the transit way. This 1-foot addition to the amenity zone would result from adding 1 foot to the inside edge of the transit way, providing the bus more space to travel and reducing the mirror overhang into the amenity zone.

Each pedestrian area would consist of a patio/gathering area, amenity zone with trees, and a minimum 10-foot clear, unobstructed pedestrian walkway free of encroachments from elements such as furnishings, kiosks, and shuttle stops. The patio/gathering area would be 9 feet wide on the narrow side of the block and 15 feet wide on the wide side of the block.

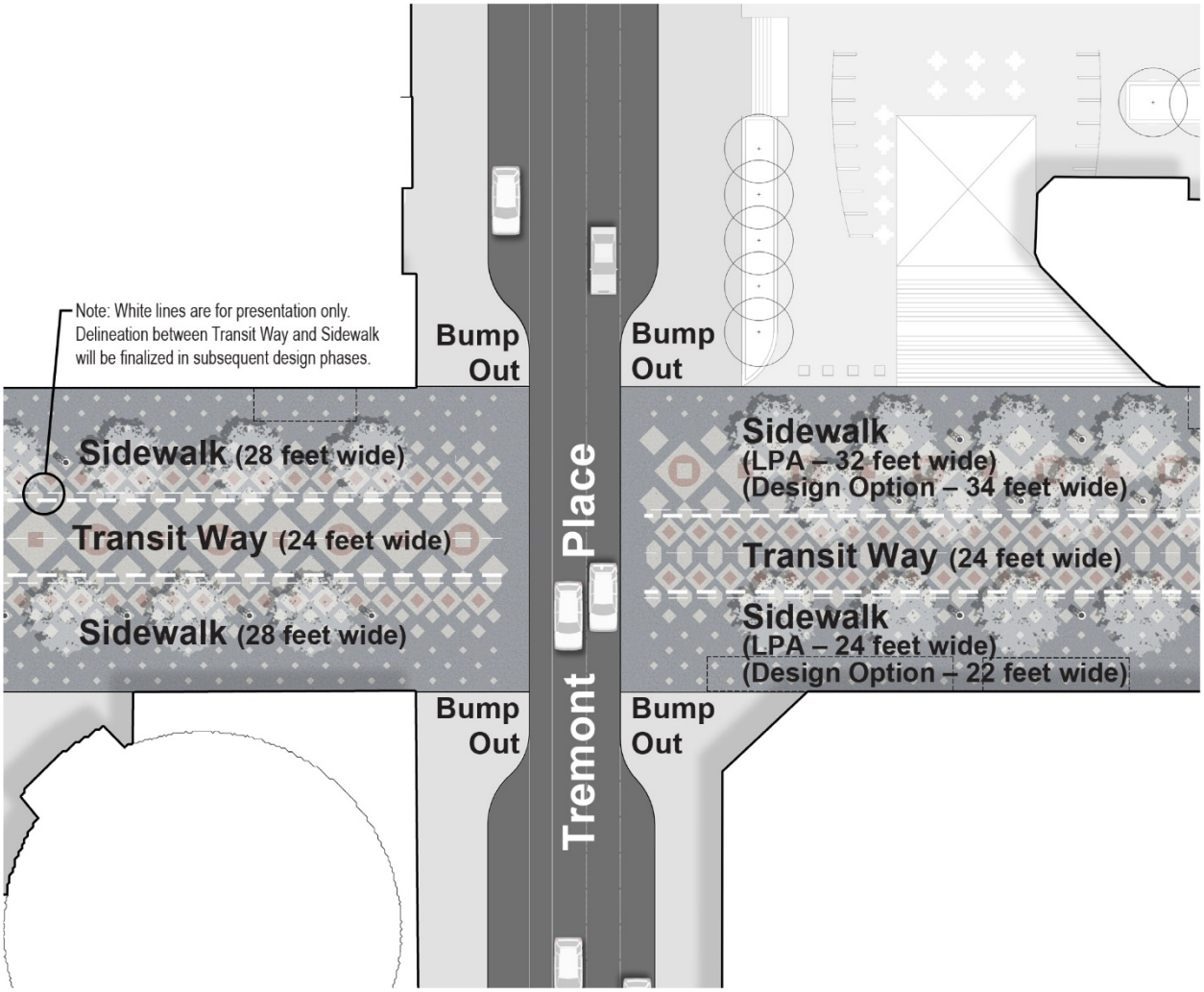
From Arapahoe Street to Tremont Place the alignment would be the center-running cross-section design (**Figure 7-1**). The center-running cross-section design places the two existing transit way lanes together into a single transit way comprising two adjacent 12-foot-wide transit ways, without a median separating them. The cross-section design has equal widths of pedestrian area, 28 feet, on each side of the block, which also allows for additional flexibility in programing the space in a manner that would allow more pedestrians to use it. Each pedestrian area would consist of 9-foot patio/gathering space, a 9-foot tree/amenity zone, and a 10-foot-wide clear, unobstructed pedestrian walkway free of encroachments from elements such as furnishings, kiosks, and shuttle stops.

From Tremont Place to Cleveland Place, the alignment would, again, be the new asymmetrical cross-section design, with a transition to the existing conditions of the half-block gateway plaza between Cleveland Place and Broadway (**Figure 7-1**).

The new transit way alignment would change the locations of the existing vertical curbs between the existing pedestrian walkways and transit ways. Along the edges of the transit way, the LPA would be constructed with vertical curbs, similar to those on the outside edges of the existing transit way lanes, at designated shuttle stops, cross streets, and intersections; the vertical curbs would then transition to a pan, similar to the pan on the inside edges of the existing transit way lanes but with a shallow longitudinal channel within the pan to direct water as part of the drainage system. Constructing the LPA with vertical curbs at shuttle stops and a pan along the remainder of the transit way meets requirements for both transit operations and public use programming flexibility.

The LPA would maintain the progression of a beginning, middle, and end of the Mall through the design of asymmetrical blocks at the beginning and end of the Mall and symmetrical blocks in the middle of the Mall. Transitions between cross-section designs would occur at four locations on the Mall: (1) the western Project limits at Market Street, (2) at Arapahoe Street where the cross-section design changes from new asymmetrical to center running, (3) at Tremont Place where the cross-section design changes back from center running to new asymmetrical, and (4) at Cleveland Place, where the cross-section design transitions to the Gateway Plaza. At the Arapahoe and Tremont Place transitions, the east and westbound transit way lanes would shift 4 feet, while under existing conditions the eastbound transit way lane doesn't shift and the westbound transit way lane shifts 16 feet. At the Project limit transitions, the LPA will tie into the existing transit ways. **Figure 7-3** illustrates the transition from the center-running cross-section design to the new asymmetrical cross-section design at Tremont Place.

Figure 7-3. Transition at Tremont Place



b) LPA Design Option

From Market Street to Lawrence Street (versus Arapahoe Street in the LPA) the alignment would be a modified asymmetrical cross-section design (**Figure 7-2**) (versus the LPA New Asymmetrical cross-section design [**Figure 7-1**]). The modified asymmetrical cross-section design removes the existing 6-foot median with light fixtures from between the transit way lanes, pushes the two transit way lanes together into a single transit way comprising two adjacent 12-foot transit way lanes, and increases the size of the pedestrian area on the narrow side of the cross-section from 17 to 22 feet (versus 24 feet in the LPA).

The LPA Design Option would maintain the location of the pavement pattern, trees, and lights on the wide side of the block (versus shifting them 2 feet north in the LPA) and would add 1 foot of usable space to the amenity zone to reduce the amount of bus mirror overhang at the edge of the transit way. This 1-foot addition would not change the pavement pattern on the wide side of the block because 1 foot would be added to the inside edge of the transit way,

providing the bus more space to travel and reducing the mirror overhang into the amenity zone.

Each pedestrian area would consist of a patio/gathering area, amenity zone with trees, and a 10-foot clear, unobstructed pedestrian walkway free of encroachments from elements such as furnishings, kiosks, and shuttle stops. The patio/gathering area would be 7 feet wide on the narrow side of the block (versus 9 feet in the LPA) and 15 feet wide on the wide side of the block.

From Lawrence Street to Court Place (versus Arapahoe Street to Tremont Place in the LPA) the alignment would be the center-running cross-section design (**Figure 7-2**). The design option would extend the center-running cross section into two blocks that are currently asymmetrical blocks: the block between Lawrence Street and Arapahoe Street and the block between Tremont Place and Court Place. The center-running cross-section design would be the same as described for the LPA in **Section 7.A.1(a)**.

From Court Place (versus Tremont Place in the LPA) to Cleveland Place, the alignment would, again, be the modified asymmetrical cross-section design (versus the LPA New Asymmetrical cross-section design), with a transition to the existing conditions of the half-block gateway plaza between Cleveland Place and Broadway (**Figure 7-2**).

The design option curbs would be constructed in the same manner as described for the LPA in **Section 7.A.1(a)**, with vertical curbs at designated shuttle stops, cross streets, and intersections and a pan along the remainder of the transit way.

The design option would maintain the progression of beginning, middle, and end “rooms” of the Mall through the design of asymmetrical blocks at the beginning and end of the Mall and symmetrical blocks in the middle of the Mall. However, the design option would change the size and locations of these rooms in comparison to existing conditions and the LPA, reducing the size of the asymmetrical beginning and end rooms by one block each, and increasing the size of the middle room by two blocks. Transitions between cross-section designs would occur at four locations on the Mall: (1) the western Project limits at Market Street, (2) at Lawrence Street (versus Arapahoe Street in the LPA) where the cross-section design changes from asymmetrical to center running, (3) at Court Place (versus Tremont Place in the LPA) where the cross-section design changes back from center running to asymmetrical, and (4) at Cleveland Place, where the cross-section design transitions to the Gateway Plaza. At the Lawrence Street and Court Place transitions, the east and westbound transit way lanes would shift 6 feet (versus 4 feet in the LPA), while under existing conditions the eastbound transit way lane doesn’t shift and the westbound transit way lane shifts 16 feet. At the Project limit transitions, the LPA Design Option will tie into the existing transit ways. **Figure 7-3** illustrates the transition from the center-running cross-section design to the new asymmetrical cross-section design at Tremont Place.

2. Pavement Materials and Pattern

The LPA would be implemented with granite pavers arranged to mimic the Mall's existing color and pattern in the transit way and pedestrian areas. The pavement pattern would honor and complement the existing character of the I.M. Pei- and Hanna/Olin-designed mall by retaining the 45-degree-diagonal grid to resemble the historic Navajo rug-themed pattern and retain the small, medium, and large diamond patterns in the same (or approximately the same) spatial relationship as the original design in the symmetrical blocks. The LPA would also retain the pattern in approximately the same spatial relationship in the asymmetrical blocks, but the overall pattern would be shifted 2 feet to the north (similar to moving a patterned carpet) on the wide side of the block to allow for the wider pedestrian area on the narrow side of the block. The LPA Design Option would not shift the pattern on the wide side of the asymmetrical blocks, and the resulting pedestrian area on the narrow side of the block would be 2 feet narrower than under the LPA. Localized minor adjustments may be required during subsequent design phases to accommodate unforeseen design challenges, infrastructure needs, compliance with federal requirements such as ADA and homeland security standards, safety improvements, and CCD and RTD criteria.

The granite pavers would have improved surface friction and would be arranged and secured on new sub-base. The existing concrete sub-base slabs would be removed and replaced, complete with a new system to drain moisture that penetrates the surface. The surface and sub-base drainage system would discharge water to inlets connected to the local storm sewer; water quality treatment features would be installed to remove pollutants and sediment from the water.

3. Trees and Tree Infrastructure

The LPA would remove the existing trees and replace them with a variety of tree species that fit within the context of the design and thrive in Colorado's climate. Tree placement would honor the existing character of the Mall by retaining geometric and spatial relationships and the colors and aesthetic qualities of the existing tree species. The original monoculture design of red oak trees on the asymmetrical blocks and honey locusts on the symmetrical blocks would be replicated as closely as possible while maintaining current CCD tree diversity standards, which require multiple tree species to be planted in a single block. Tree diversity standards prevent single-species diseases from destroying entire blocks of trees, such as the disease that killed the majority of red oak trees on the Mall. Tree species have been selected using both current CCD forestry requirements and similar criteria to those used to select tree species during design of the original Mall. The LPA would also remove the existing tree boxes with 300-cubic-foot soil capacity and replace them with new suspended tree infrastructure that provides 1,000 cubic feet of soil volume, such as a silva cell or equivalent system. Landscape irrigation would be removed and replaced.

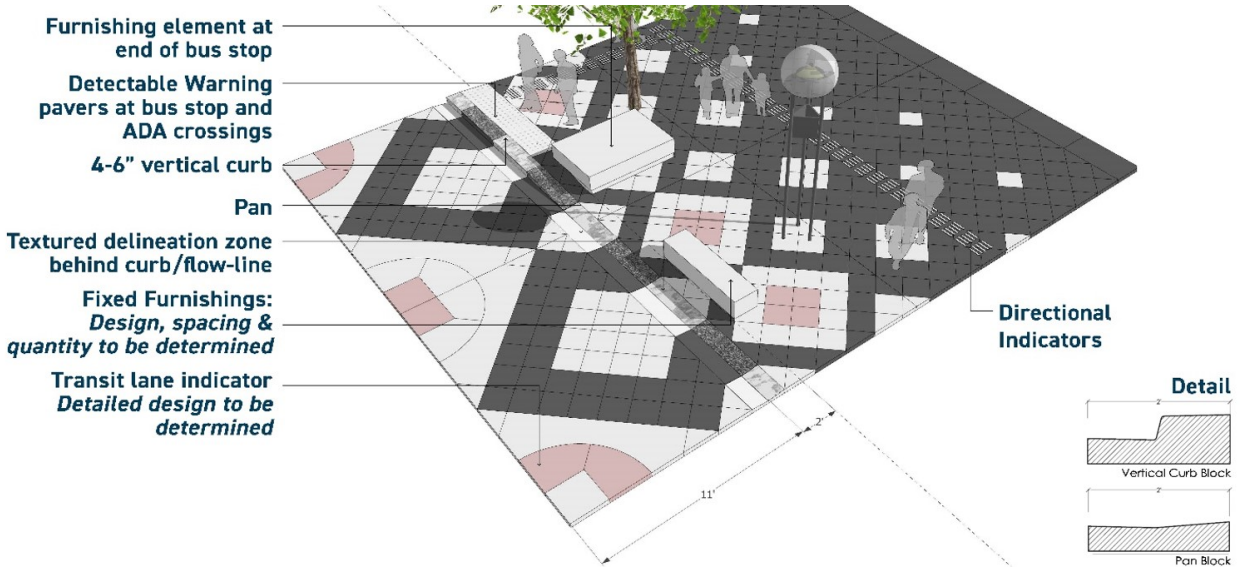
4. Edge Delineation

The LPA would move the edges of the transit lanes, which are currently defined by vertical curbs on their outside edges and pans on their inside edges (**Figure 6-1**), to new locations closer to the center of the block. The edges of the new transit way would be defined by vertical curbs

at designated shuttle stops, cross streets and intersections, and a pan along the remainder of the transit way. The vertical curb and pan units would be constructed of rectangular granite units in the same dimensions and colors as the existing units, designed to blend into the surrounding pavement pattern. On the center-running blocks, the vertical curb and pan units would be in the exact same location as the existing pan between the transit ways and the median.

Design features for safety and ADA compliance include texture on the back of the vertical curb and pan granite units, an amenity zone with fixed furnishings to separate the transit way from the pedestrian walkway, directional indicators within 10-foot pedestrian walkways, truncated domes at designated crossings, and consideration of truncated domes at shuttle stops (**Figure 7-4**). The vertical curb and pan granite units would mimic the existing pattern and colors. Although pedestrians can cross the transit way at any point along the Mall, the designated crossings will be clearly marked and occur at cross streets and at the ends of each block. The separation of pedestrian walkways from the transit way by an amenity zone with fixed furnishings would increase safety and be consistent with guidance (FHWA, 2013 and 2017; NACTO, 2013 and 2016; RTD, 2016a). The textured changes in the pavement, to delineate the pedestrian walkway and the amenity zone from the transit way would assist visually impaired users in wayfinding. Transit lane indicators will guide shuttle operators in immediately adjacent transit lanes without a median separating them. The transit way indicator technique will be decided in subsequent design phases.

Figure 7-4. Transit Way Edge Delineation



Drainage inlets on the Mall currently consist of linear metal grates contained within the 2-foot-wide linear curb strip. Under the LPA, the drainage flowline and inlets would move to the new edge of the transit way and surface runoff would drain into new inlets contained within the 2-foot-wide linear vertical curb or pan strip. Additionally, some areas of the Mall could be designed with supplemental drainage to remain in its existing location, and surface runoff would drain into or in line with the proposed tree wells. The new drainage inlets would not introduce a new linear element into the historic pavement pattern, and inlets would be designed to be context sensitive or resemble the existing inlets.

5. Utilities and Technologies of the Future

The LPA would upsize electrical conduits and wiring to allow for expanded capacity and remove and replace landscape irrigation and drainage infrastructure. The LPA would also provide the opportunity to install fiber optic and/or telecommunications utilities to meet current and future demands. Wifi, Lidar, Infrared, and other communication systems may be installed aboveground to allow for future technologies.

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

6. Safety and Security

The LPA would include a vertical curb at designated shuttle stops and cross streets; a pan at the edge of the transit way in other locations; an amenity zone between the transit way and pedestrian walkway with trees, lights, and furnishings such as benches and chairs, and delineating elements of texture on the back of the vertical curb and pan granite units; directional indicators at the edges of the 10-foot pedestrian walkways; and truncated domes at designated crossings and shuttle stops, consistent with RTD standards (2016a) and national guidance (NACTO, 2013; NACTO, 2016; FHWA, 2017).

The new granite pavers would be less slippery than the existing pavers. The amount of friction on the surface of the transit way and pedestrian areas would be determined by RTD and CCD in a subsequent design phase, to reduce incidents related to slipping and sliding of both pedestrians and vehicles.

CPTED principles promote the design, maintenance, and use of the built environment to enhance quality of life and to reduce both the incidence and fear of crime. The design of the LPA incorporates the following CPTED principles:

- Natural surveillance – The LPA includes clear sight lines such that all spaces in the Mall are visible to others; a person is less likely to commit a crime if they think it will be witnessed
- Territoriality – Placement of pedestrian walkways and gathering spaces adjacent to buildings instead of separated in a center median allows for active “ownership” of all pedestrian areas of the Mall by adjacent properties; potential trespassers perceive this ownership and are discouraged from illicit activities
- Access control – Use of walkways, lighting, and landscape to clearly guide where people walk and spend time on the Mall; the goal with this CPTED principle is to direct the flow of people while decreasing the opportunity for crime
- Management and maintenance – The current maintenance and security programs on the Mall (for example, Downtown Security Action Plan) would continue; well-managed and maintained properties make places safer
- Activity support – The LPA provides appealing gathering spaces that draw people to spend time on the Mall and continues active programming that brings people to the Mall, such as concerts and markets; the presence of pedestrian users engaged in activities on the Mall discourages illicit activities by people who desire anonymity for their actions

The LPA would also comply with federal homeland security requirements and RTD's Safety Design Criteria.

7. Lighting, Signage, and Furnishings

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

The LPA would incorporate signage and furnishings; their design and locations would be determined during subsequent design phases and would comply with applicable codes, and accommodate people with disabilities, as applicable.

8. Changes to Cross Streets

Bulb-outs would be implemented on cross streets to slow traffic and reduce the crossing distance for pedestrians on those streets, except for instances where space is reserved for existing bicycle or light rail infrastructure. Bicycle and light rail transit (LRT) infrastructure would be maintained through the Project limits. The elimination of the median would consolidate pedestrian crossings to two locations at each cross-street intersection. Changes to pedestrian crossing controls such as crosswalks and crossing signals would be decided during subsequent design phases. New crossing signals will be constructed. Additional intersection improvements to slow traffic and increase pedestrian safety (for example, pavement patterns, pavement color, pavement texture, or raised pavement) would be considered during subsequent design phases.

9. Funding

CCD would use Downtown Urban Renewal Authority (DURA) Tax Incremental Financing (TIF) funds, as well as funds from the recently passed Denver 2017 General Obligation (GO) Bonds. The DURA TIF Board of Commissioners approves the use of DURA TIF funds, and those funds must be used on downtown renewal projects. The DURA TIF funds intended for this project must be spent by 2022. The use of Denver 2017 GO Bonds was recommended in the *2017 GO Bond – Mayor Recommended Package of Investments* (CCD, 2017b). RTD has two federally funded grants to rehabilitate portions of the Mall, which it intends to contribute to the Project if FTA and Denver Regional Council of Governments (DRCOG) approve the transfer of funds and CCD and RTD implement an IGA. The use of FTA grant funds requires FTA approval under NEPA. Ongoing maintenance of the transit way would be funded through an IGA between CCD and RTD. The level of maintenance is expected to be significantly reduced from existing levels. Funding for maintenance of pedestrian areas would continue to be provided through an IGA between CCD and the BID. An IGA between CCD and RTD will ensure that pedestrian walkways maintain the necessary 10-foot clear width for unimpeded pedestrian traffic.

B. Transit Operations

The LPA would accommodate existing and planned Free MallRide transit operations, LRT service operations, and connecting transit service. The transit way would consist of two 12-foot transit way lanes adjacent to each other, with no median or light fixtures between them, except at the half-block triangle plaza between Cleveland Place and Broadway, where the existing area with

light fixtures between transit lanes would be reconstructed in place. A transit lane indicator between transit lanes would be applied in the transit way to aid shuttle operators by clearly defining the inside edge of the transit lanes. The transit lane indicator technique is undecided. Possible techniques include but are not limited to textured pavement, reflective surface treatments and other emerging technologies, with the intent of minimizing visual changes to the pavement pattern. Operations for the Free MallRide and connecting transit services would not change as a result of implementing the LPA and continued Free MallRide operation will be included in an IGA between RTD and CCD.

C. Traffic Operations

Implementation of the LPA would not change long-term operational characteristics of the cross streets or permitted vehicles on the Mall. Incidental uses such as bicycles, horse-drawn carriages, and pedi-cabs (which are allowed on the Mall only during offpeak transit times), would not change under the LPA. Bulb-outs and other intersection improvements to be decided during subsequent design phases would calm traffic in cross streets. Within the cross streets, capacity, lane width, and traffic controls and timing would follow the same concept of operations.

D. Construction Activities

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

1. Timeline, Phasing, and Access

Construction of the LPA is anticipated to take 2.5 to 4 years in total. Major construction activities on each block are anticipated to last approximately 8 months to 12 months; however, minor construction activities or unforeseen utility-related construction activities may last longer. Construction will generally occur in two- to six- block segments and multiple segments may be under construction at one time; each segment will require multiple construction phases. Construction will occur within the Project limits illustrated on **Figure 3-1**. Construction phasing will be determined using the following assumptions:

- Maintain reasonable access to businesses during all phases of construction.
- Maintain reasonable access for traffic on cross streets during all phases of construction, except for limited intermittent closures.
- Maintain two-way Free MallRide service for a majority of the distance and Project duration, except for limited intermittent detours. Four scenarios for transit operations during construction have been used to analyze construction impacts in **Section 3**, Environmental Resources, and **Section 4**, Transportation Systems, of the EA; the scenarios are further detailed in those sections.
- Maintain LRT and other connecting transit services on the Mall, except for limited intermittent interruptions as agreed upon by the contractor and RTD, during all phases of construction.
- Maintain reasonable and regulatory compliant access for Free MallRide service, LRT service, and other connecting transit services as agreed upon by the contractor and RTD during all

phases of construction. The regulatory compliance aspects include maintaining access for people with disabilities.

The impact analysis and mitigation recommended in the Project EA are presented to allow the contractor sufficient flexibility to balance cost against schedule, community disruption and mitigation. A Project Management Plan (PMP) and Traffic Management Plan (TMP) will be developed and will include the mitigation measures committed to in **Section 3**, Environmental Resources, and **Section 4**, Transportation Systems, of the EA. The PMP and TMP will be updated as the advancement of design, construction staging, and stakeholder outreach allows for additional decisions to be made regarding impacts and measures to mitigate impacts. The PMP will also include a Public Information Plan (PIP), which will serve to prepare project-area residents, businesses, and commuters for what to expect during construction, listen to their concerns, and develop plans to minimize disruptive effects.

2. Staging

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

3. Construction Activities

Construction activities would generally include, and require equipment for: deconstruction; construction of temporary facilities for maintenance of access and safety; construction of permanent subsurface features; and construction of aboveground surface, traffic control, wayfinding, drainage, communications, lighting, and landscape features. It is anticipated that night work may be performed, and 24-hour construction may be required in some cases to accommodate the construction schedule, maintenance of access, or related stakeholder requirements. Access to the construction site will be controlled through appropriate standards set forth by the Colorado Department of Public Health and Environment, CCD Occupational Safety and Health Administration, CCD Department of Public Works, the Manual on Uniform Traffic Control Devices, the National Fire Protection Association 130 Standard for Fixed Guideway Transit and Passenger Rail Systems, and other applicable regulatory requirements. Haul routes to and from the construction site or staging site(s) will be determined during subsequent design phases. Existing haul routes will be used to the extent practicable.

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Appendix C
Draft Programmatic Agreement

DRAFT

PROGRAMMATIC AGREEMENT
AMONG
THE FEDERAL TRANSIT ADMINISTRATION,
THE COLORADO STATE HISTORIC PRESERVATION OFFICER,
AND
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING
IMPROVEMENTS TO THE 16TH STREET MALL
CITY AND COUNTY OF DENVER, COLORADO

WHEREAS, the Federal Transit Administration (FTA), as the lead federal agency, has determined that Improvements to the 16th Street Mall (collectively, such improvements are referred to herein as the Project) constitute an Undertaking under 36 *Code of Federal Regulations* (CFR) 800.16(y), which requires compliance with Section 106 of the National Historic Preservation Act (54 United States Code [U.S.C.] § 306108) and its implementing regulations in 36 CFR Part 800; and

WHEREAS, a group of partners comprising FTA, the Regional Transportation District (RTD), the City and County of Denver (CCD), and Downtown Denver Partnership (DDP) propose to implement improvements to the 16th Street Mall (Mall), a transit way and commercial corridor in the downtown of the City and County of Denver, Colorado, to address infrastructure, mobility, safety, and public use needs, for which RTD has received financial assistance from the FTA; and

WHEREAS, the Project is a federal Undertaking that proposes to develop and implement a flexible and sustainable design for the Mall to address deteriorating infrastructure, provide equitable and sufficient space for high-quality public gathering opportunities, improve pedestrian and vehicle safety, and continue safe and accessible two-way transit shuttle service (Free MallRide) on the Mall, while honoring the Mall's use and iconic design; and

WHEREAS, the Project will reconstruct the entire 12.5 blocks of the historic Mall property, including the following anticipated improvements: (1) the transit way will be realigned, pedestrian walkways will be expanded, new amenity zones will be added, and existing patio spaces will be maintained; (2) subsurface drainage systems, utilities, and tree boxes and irrigation systems will be replaced; (3) the pavement surface, including granite pavers and mortar, will be replaced with similar appearing granite pavers; (4) trees will be replaced, and new trees will be added; and (5) replica light fixtures will be added and relocated as needed; and

WHEREAS, the Colorado State Historic Preservation Officer (SHPO) is authorized to enter into this Programmatic Agreement (PA) to fulfill its role of advising and assisting federal agencies in carrying out their responsibilities under 36 CFR § 800.2(c)(1)(i) and § 800.6(b); and

WHEREAS, CCD owns 16th Street, RTD operates transit service, and CCD and RTD maintain and finance maintenance for the transit way on the Mall through an intergovernmental agreement between RTD and CCD; and

WHEREAS, the Downtown Denver Partnership (DDP), through its management of the Downtown Denver Business Improvement District (BID), operates, maintains, and finances maintenance for the pedestrian zones of the Mall through an intergovernmental agreement between the BID and CCD; and

WHEREAS, RTD has received federal financial assistance from FTA and will coordinate with CCD as the sub-recipient of such federal funds. CCD will manage the design and construction of the Project; and

WHEREAS, RTD has participated with FTA in consultation for the Undertaking and has been invited to sign this PA as an Invited Signatory; and

WHEREAS, FTA and SHPO have consulted with CCD regarding the effects of the Undertaking on historic properties and have invited CCD to sign this PA as an Invited Signatory; and

WHEREAS, FTA and SHPO have consulted with DDP regarding the effects of the Undertaking on historic properties and have invited DDP to sign this PA as an Invited Signatory; and

WHEREAS, FTA and SHPO have requested the Concurring Parties to concur in this PA, indicating acceptance of the process leading to the PA and a desire and willingness to participate in future consultations if needed, but the PA may be executed, amended and/or terminated without concurrence from the Concurring Parties; and

WHEREAS, FTA and SHPO have consulted with Historic Denver, Colorado Preservation, Inc., the National Trust for Historic Preservation, the Landmark Preservation Commission, and the Lower Downtown Design Review Board as "Consulting Parties" regarding the Undertaking on historic properties, in accordance with and as defined by 36 CFR 800.6(b)(2) and have invited these parties to sign this PA as Concurring Parties; and

WHEREAS, FTA has provided for public involvement in accordance with 36 CFR 800.8(a)(1) by coordinating Section 106 consultation with public review and participation via an Environmental Assessment for the Undertaking under provisions of the National Environmental Policy Act (NEPA), 42 U.S.C. §4321 et. seq.; and

WHEREAS, this PA was developed with appropriate public involvement pursuant to 36 CFR 800.2(d) and 800.6(a), and the public was provided the opportunity to comment on the Undertaking and the draft PA during the comment period for the Environmental Assessment; and

WHEREAS, FTA, in consultation with the SHPO and other Consulting Parties, in accordance with 36 CFR § 800.4(a)(1), has established the Project's Area of Potential Effects (APE), which includes 16th Street from Market Street to Broadway and one parcel on each side of the corridor (Attachment 1); and

WHEREAS, FTA, in consultation with the SHPO and other Consulting Parties, and in accordance with 36 CFR §§ 800.4(b) and 800.4(c), has identified 32 historic properties within the APE, where historic property is defined as a property listed on or eligible for listing on the National Register of Historic Places (NRHP), Attachment 1 contains a map book showing the locations of the historic properties within the APE, and Attachment 2 is a summary table of the historic properties within the APE; and

WHEREAS, the Mall, an 80-foot-wide linear transit way and pedestrian/commercial corridor of 12.5 blocks with three distinct zones (asymmetrically aligned end blocks and symmetrically aligned center blocks) was built between 1980 and 1982. The Mall is an NRHP-eligible historic property under Criterion A in the areas of Transportation and Community Planning and Development, under Criterion C as an award-winning landscape design by I.M. Pei & Partners, and under Criteria Consideration G, as exceptionally significant at the state and local level, because of the Mall's role in shaping downtown Denver and the Mall's distinctive design by a team of master designers, which is unique in the state; and

WHEREAS, FTA, in consultation with the SHPO and other Consulting Parties, has identified the following character-defining features of the Mall transit way historic property: consistent paving pattern design; granite paver units/modules that are square (1-foot-5-inch by 1-foot-5-inch), in three shades~~:~~ charcoal gray, light gray, and "Colorado red" (specified as White, Black, and Red on the 1980 plans); granite special units of charcoal and light gray for curbs, cuts, drains, and other applications;

red oak and honey locust trees planted in specially designed under-pavement concrete root boxes and 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; and custom metal street signs on traffic signals and overhead lights; and

WHEREAS, FTA, in consultation with the SHPO, has determined the Undertaking will have an Adverse Effect on the Mall historic property from known effects to character-defining features, including shifts in the historic alignment, removal of existing granite pavers and replacing with new granite pavers, removal of original street furniture and some fixtures, removal and replacement of existing trees, shifts in some tree locations, removal of the specifically designed tree boxes, a change in the number and kinds of tree species, and introduction of an additional row of trees on the asymmetrical end blocks, increasing the overall number of trees; and

WHEREAS, the FTA, in consultation with the SHPO, has determined the Undertaking would result in No Adverse Effect on 30 of the remaining historic properties and No Historic Properties Affected on 1 remaining historic property in the APE, and SHPO concurred with this effect finding on June 29, 2018; and

WHEREAS, in accordance with 36 CFR § 800.6(a)(1), FTA notified the Advisory Council on Historic Preservation (ACHP) on July 5, 2018, of the finding of adverse effect for the Undertaking with specified documentation, and ACHP responded on July 31, 2018, agreeing to participate in the consultation pursuant to 36 CFR § 800.6(a)(1)(iii); and

WHEREAS, for the purpose of this PA, "Signatories" are defined as the above-identified Signatories (FTA, SHPO and ACHP) and includes the Invited Signatories (RTD, CCD and DDP); and

WHEREAS, FTA, in consultation with the SHPO and ACHP, has determined that the development of this PA in accordance with 36 CFR 800.14(b)(1)(ii) is warranted because effects on the Mall's character-defining features will require further consultation as the design of the Undertaking moves forward; and

NOW, THEREFORE, FTA, the SHPO, ACHP, RTD, CCD and DDP will ensure that the following Stipulations are implemented in order to take into account the effect of the Undertaking on historic properties, and that these Stipulations will govern the Undertaking and all of its parts.

STIPULATIONS

FTA will ensure that the stipulations of this PA are carried out and will require, as a condition of any approval of federal funding for the Undertaking, adherence to the stipulations set forth herein.

I. DESIGN COMMITMENTS

A. FTA, RTD, and CCD commit to include the following elements in the Project design of the Mall between Market Street and Broadway as shown in the drawings in Attachment 3:

1. Paving Pattern
    a. Retain a granite paver surface in the same three colors of granite pavers as the current design.
    b. Maintain overall design concept of a carpet covering the 80-foot-wide Mall property by retaining the pattern.
    c. Retain the geometric and spatial relationships within the design.
    d. Retain the 45-degree diagonal grid pattern in the design.

e. Retain the small, medium, and large diamond patterns in the same (or approximately the same) spatial relationship as the original design.
f. Maintain spatial relationship between trees and light standards.

2. Light Standards
   a. Reuse existing replicated light standards.
   b. Replicate new light standards (on narrow side of asymmetrical blocks) per the specifications shown in Attachment 3.
   c. Light levels may be adjusted.
3. Trees
   a. Place one single row of aligned trees for 12 blocks between Market Street and Cleveland Place as shown in Attachment 3.
   b. Maintain alternating trees and light standards within rows.
4. Transit way
   a. Retain two-way transit service along the Mall.
   b. Retain the existing locations of symmetrical to asymmetrical alignment shifts in the transit way cross-sections, which occur at Arapahoe Street (to Market Street) and Tremont Street (to Broadway), in keeping with the beginning, middle, and end in the original design.
   c. Close the 22-foot medians on symmetrical blocks and 6-foot medians on asymmetrical blocks to remove median areas between the transit lanes (and reallocate the space from the median to provide safe and comfortable public and pedestrian uses) as shown in Attachment 3 drawings.
5. Signage
   a. Retain extant custom metal street name signs at intersections and overhead traffic signals.

6. 16th Street: Cleveland Place to Broadway (triangle block)
   Rebuild the eastern half-block of the Mall between Cleveland Place and Broadway in its historic configuration. The reconstruction will include the following elements:
   a. Maintain the transit way alignment in current location.
   b. Maintain 6-foot median with light fixtures between transit way lanes.
   c. Replace granite pavers in existing pattern and location as shown in Attachment 3.
   d. Rebuild granite curb at the edges of transit way with existing materials and profile as shown in Attachment 3.
   e. Maintain replicated light standards in existing locations as shown in Attachment 3.
   f. Provide trees in the locations specified in the original design. Replace trees and add new species in locations where trees were removed.
   g. The repair and reconfiguration of the fountain on the north side of the plaza will be reviewed separately as part of the design review under Stipulation II.

B. It is recognized that Attachment 3 provides a design concept that will be refined as the design progresses and that other constraints, such as Americans with Disabilities Act (ADA) compliance, unforeseen site conditions, identification of underground hazards or conflicts, drainage and/or maintenance needs, and/or public safety concerns may

necessitate changes to the commitments outlined in Stipulation I.A and the matters addressed in Stipulation II.

C. To help ensure compliance with the design commitments in Stipulation I.A, the Signatories and Concurring Parties to this PA will have an opportunity to review and consult on design plans at 30, 60, and 90 percent completion for the representation of character-defining features of the Undertaking included in Attachment 3. This consultation will occur together with, and follow the process for, the design review process outlined in Stipulation II.B below.

II. DESIGN REVIEW AND CONSULTATION

A. CCD, in coordination with FTA and RTD, will provide the other Signatories and Concurring Parties the opportunity to review and provide ongoing consultation on all design elements affecting the character-defining features of the Mall that are not defined in Stipulation I according to the process described in Stipulation II.B below.

B. The design consultation process, with respect to the items described in Stipulation I and Stipulation II, will proceed as follows: CCD will submit the 30, 60, and 90 percent design development plans to Signatories and Concurring Parties for review and comment.
   1. At each design stage, Signatories and Concurring Parties will be provided advance notice of the upcoming available plans by email at least one week before the plans are made available for review;
   2. For each design review, Signatories and Concurring Parties will have 15 calendar days from receipt of a printed copy of the materials to provide written comments to CCD.
   3. Signatories and Concurring Parties may request a meeting with CCD, RTD, and FTA to discuss their comments.
   4. For each design review, CCD will provide an explanation of how the comments were evaluated and to what extent they can be incorporated into the design to the Concurring Parties within 15 calendar days after receiving the comments.

C. The following are excluded from design review:
   1. Sub-base design, including underground safety related elements, underground utilities; underground infrastructure, including drainage and electrical conduit; and underground tree boxes;
   2. Vehicular and pedestrian traffic signals, visual and tactile aids for bus drivers, and safety-related or bus stop signage.
   3. Tree species selection beyond the location of trees as specified in Stipulation I: Consultation regarding preferred tree species and the agreed-upon intent to replicate the features of the original tree design plan occurred during earlier consultation. The parties recognize that the final tree species selection will be made through a process led by qualified horticulturists in the interest of long-term viability of tree species on the Mall, while attempting to be consistent with the original tree design. The location of trees has been defined in the conceptual design plans included in Attachment 3 and referenced in Stipulation I.A.3.

III. HISTORIC PROPERTIES ENHANCEMENT PROGRAM

A. Historic Property Façade Enhancement Program

1. CCD will assist DDP in establishing a program to enhance historic building façades along the 16th Street Mall, through the funding of grants for lighting and/or façade improvements such as restoration. Grants will require equivalent matching contributions from property owners or occupants.
2. If and when a program is established, CCD will contribute $450,000 to funding the program by separate agreement, which is inclusive of administration and grant costs.
3. CCD will assist DDP in exploring options for agency or agencies to administer the program and CCD will assist DDP in creating the organizational documents for the program. DDP will be the fiscal agent and market the program to Mall property owners.
4. If a lighting program is established:
    a. The program will be generally based on the DDP *Lighting Study for 16th Street Denver Mall – Concept Design Report* published May 24, 2013.
    b. The program will require updates to the Landmark Preservation Commission (LPC) *Design Guidelines for Denver Landmark Structures and Districts*, published January 27, 2016. CCD and DDP will coordinate with LPC, following the appropriate process for design guideline changes.
5. Work under the program shall commence once construction of the Project is complete.
6. The program will last up to three years, after which time any remaining funds will be reallocated as provided under the terms of the governing documents for the program.

IV. CONSTRUCTION COMMITMENTS

A. Protection of Historic Properties During Construction

CCD will provide and fund a third-party contractor to monitor construction-related vibration. CCD will ensure that the contractor:

1. Establishes a baseline vibration threshold that takes into account any specific tolerances or sensitivities of the historic properties adjacent to the Mall;
2. Measures vibration levels during construction;
3. Alerts the construction contractor and CCD, if vibration reaches or exceeds the baseline vibration threshold;
4. If the baseline vibration threshold is continually broken, CCD will require its contractor to choose another construction method, if practical and feasible;
5. If no another construction method is practical and feasible, CCD will require its contractor to work with the property owner(s) of the affected historic property(s) to ensure the property is properly monitored during construction and that no damage occurs; and
6. CCD will provide reports and other applicable documentation from Stipulations IV.A.2 – IV.A.5 annually to FTA and the SHPO.

B. Access to Historic Properties During Construction

CCD, in coordination with property and business owners, shall ensure reasonable access to historic properties in the APE during construction. CCD, in coordination with RTD, CCD's construction contractor, and business owners will implement the Project Management Plan developed in advance of Project construction consistent with the environmental mitigation commitments in accordance with NEPA and the construction contract documents for the Project.

1. This Plan will establish access to properties adjacent to the Mall, as much as practicable.
2. CCD will take steps to ensure that its construction contractor adheres to the Project Management Plan and to CCD ordinances and standards for maintaining access to historic properties during construction.

V. NATIONAL REGISTER OF HISTORIC PLACES EVALUATION

A. After construction of the Project is complete, RTD will prepare an updated Colorado Office of Archaeology and Historic Preservation Form 1403 for the Mall, recording the changes to the property from the Project and including assessment of post-Project NRHP eligibility status.
B. FTA and RTD will submit the completed form to Signatories and Concurring Parties for review and comment.
C. Signatories and Concurring Parties will be provided 30 days to provide comments to RTD.
D. FTA and RTD will respond to comments within 30 days of receipt of comments.

VI. UPDATE MALL MAINTENANCE GUIDELINES

A. CCD, in coordination with RTD and DDP, will develop new or update existing policies, plans, manuals, and/or guidelines for maintenance of the Mall to ensure the condition of the rebuilt Mall is maintained long-term.
B. These new or updated policies, plans, manuals, and/or guidelines will include instructions for maintaining the design commitments in Stipulations I and II.
C. CCD will complete the appropriate plans, manuals, or guidance within one year of the completion of the Project construction.
D. CCD will provide Signatories and Concurring Parties with the opportunity to review and comment on the new or updated policies, plans, manuals, and/or guidelines related to maintenance of elements that convey the Mall's historic significance, as defined in the revised Form 1403 per Stipulation V above. CCD will consider input from the Signatories and Concurring Parties when finalizing the new or updated policies, plans, manuals, and/or guidelines.

VII. DURATION

This PA will be null and void if its terms are not carried out within ten (10) years from the date of its execution. Prior to such time, FTA may consult with the other Signatories to reconsider the terms of the PA and amend it in accordance with Stipulation XIII below.

VIII. POST-REVIEW DISCOVERIES

See the Unanticipated Discoveries Plan (UDP) in Attachment 4 for more detailed information regarding the following steps and procedures.

A. Inadvertent Discovery of Cultural Resources
    1. If, during Project implementation, CCD uncovers any unanticipated, previously unidentified historic archaeological, or paleontological materials, CCD will proceed in accordance with the procedures outlined in the UDP in Attachment 4 and notify FTA and other Signatories. CCD will not proceed with construction within 30 feet of the discovery until the requirements of 36 CFR 800.13 have been satisfied.
    2. Cultural resources include remains of prehistoric or historic structures, prehistoric or historic artifacts, and plant or animal bones and fossils.

B. Human Remains

1. In the event of the discovery of any human remains, funerary objects, sacred objects, or objects of cultural patrimony, as defined in 43 CFR § 10.2(d), CCD will stop work within 50 feet of the discovery until a qualified archaeologist can examine the resources and assess their significance. CCD will follow the procedures outlined in Colorado Revised Statutes (CRS) 24-80-1301 to 1304, Unmarked Human Graves.
2. Construction will not resume in the location of the discovery until the requirements of CRS 24-80-1302 are met.

IX. PROFESSIONAL QUALIFICATIONS

RTD and CCD shall ensure that all historic preservation and archaeological activities carried out pursuant to this PA shall be accomplished by or under the direct supervision of a person or persons who meet(s) or exceed(s) the pertinent qualifications in the Secretary of the Interior's *Professional Qualification Standards* (48 Federal Register [FR] §§44738-44739) in those areas in which the qualifications are applicable for the specific work performed.

X. MONITORING AND REPORTING

Each year following the execution of this PA until it expires or is terminated, RTD and CCD shall provide the other Signatories and Concurring Parties a Summary Report detailing work undertaken pursuant to its terms. Such report shall include any material Project problems encountered, reports from Stipulation IV.A, and any disputes and objections received by FTA during efforts to carry out the terms of this PA.

XI. DISPUTE RESOLUTION

Should any Signatory to this PA object at any time to any actions proposed by another Signatory or Concurring Parties or the manner by which the terms of this PA are implemented, such party shall consult with FTA to resolve the objection. If FTA determines that such objection cannot be resolved, FTA will:

A. Forward all documentation relevant to the dispute, including the FTA's proposed resolution, to the ACHP. ACHP shall provide FTA with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation. Prior to reaching a final decision on the dispute, FTA shall prepare a written response that considers any timely advice or comments regarding the dispute from ACHP, Signatories and Concurring Parties and provide the applicable party with a copy of this written response. FTA will then proceed according to the FTA's final decision.

B. If the ACHP does not provide its advice regarding the dispute within thirty (30) days, FTA may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, FTA shall prepare a written response that considers any timely comments regarding the dispute from the Signatories and Concurring Parties and provide the applicable party and ACHP with a copy of such written response.

C. FTA's responsibility to comply with the terms of this PA that are not the subject of the dispute remain unchanged.

XII. AMENDMENTS

This PA may be amended by an amendment executed by all Signatories. The amendment will be effective on the date a fully executed copy is filed with the ACHP.

XIII. TERMINATION

If any Signatory to this PA determines that such Signatory cannot comply with the terms hereof, such Signatory shall immediately consult with the other Signatories to amend this PA

per Stipulation XIII, above. If the Signatories do not amend the PA within thirty (30) days (or another time period agreed to by all Signatories), any Signatory may terminate the PA upon written notification to the other Signatories.

Once the PA is terminated, and prior to continuing work on the Undertaking, FTA must either (a) execute a new PA or MOA pursuant to 36 CFR § 800.6 or (b) request, consider and respond to the comments of the ACHP under 36 CFR § 800.7. FTA shall notify the Signatories as to the course of action it will pursue.

EXECUTION of this PA by FTA, ACHP, SHPO, RTD, DDP, and CCD, the submission of documentation and filing of this PA with the ACHP pursuant to 36 CFR § 800.6(b)(1)(iv) prior to FTA's approval of the Undertaking, and implementation of the terms of this PA provide evidence that FTA has taken into account the effects of this Undertaking on historic properties and afforded the ACHP an opportunity to comment.

PROGRAMMATIC AGREEMENT
AMONG
THE FEDERAL TRANSIT ADMINISTRATION,
THE COLORADO STATE HISTORIC PRESERVATION OFFICER,
AND
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING
IMPROVEMENTS TO THE 16TH STREET MALL
CITY AND COUNTY OF DENVER, COLORADO

SIGNATORIES:

Federal Transit Administration

_____ Date
Cindy Terwilliger, Regional Administrator

Advisory Council on Historic Preservation

_____ Date
John M. Fowler, Executive Director

Colorado State Historic Preservation Officer

_____ Date
Steve Turner, AIA, State Historic Preservation Officer

PROGRAMMATIC AGREEMENT
AMONG
THE FEDERAL TRANSIT ADMINISTRATION,
THE COLORADO STATE HISTORIC PRESERVATION OFFICER,
AND
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING
IMPROVEMENTS TO THE 16TH STREET MALL
CITY AND COUNTY OF DENVER, COLORADO

INVITED SIGNATORIES:

City and County of Denver

_____ Date
[insert name and title]

Regional Transportation District

_____ Date
[insert name and title]

Downtown Denver Partnership

_____ Date
[insert name and title]

PROGRAMMATIC AGREEMENT
AMONG
THE FEDERAL TRANSIT ADMINISTRATION,
THE COLORADO STATE HISTORIC PRESERVATION OFFICER,
AND
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING
IMPROVEMENTS TO THE 16TH STREET MALL
CITY AND COUNTY OF DENVER, COLORADO

CONCURRING PARTIES:

Historic Denver

_____ Date
[insert name and title]

Landmark Preservation Commission

_____ Date
[insert name and title]

Colorado Preservation, Inc.

_____ Date
[insert name and title]

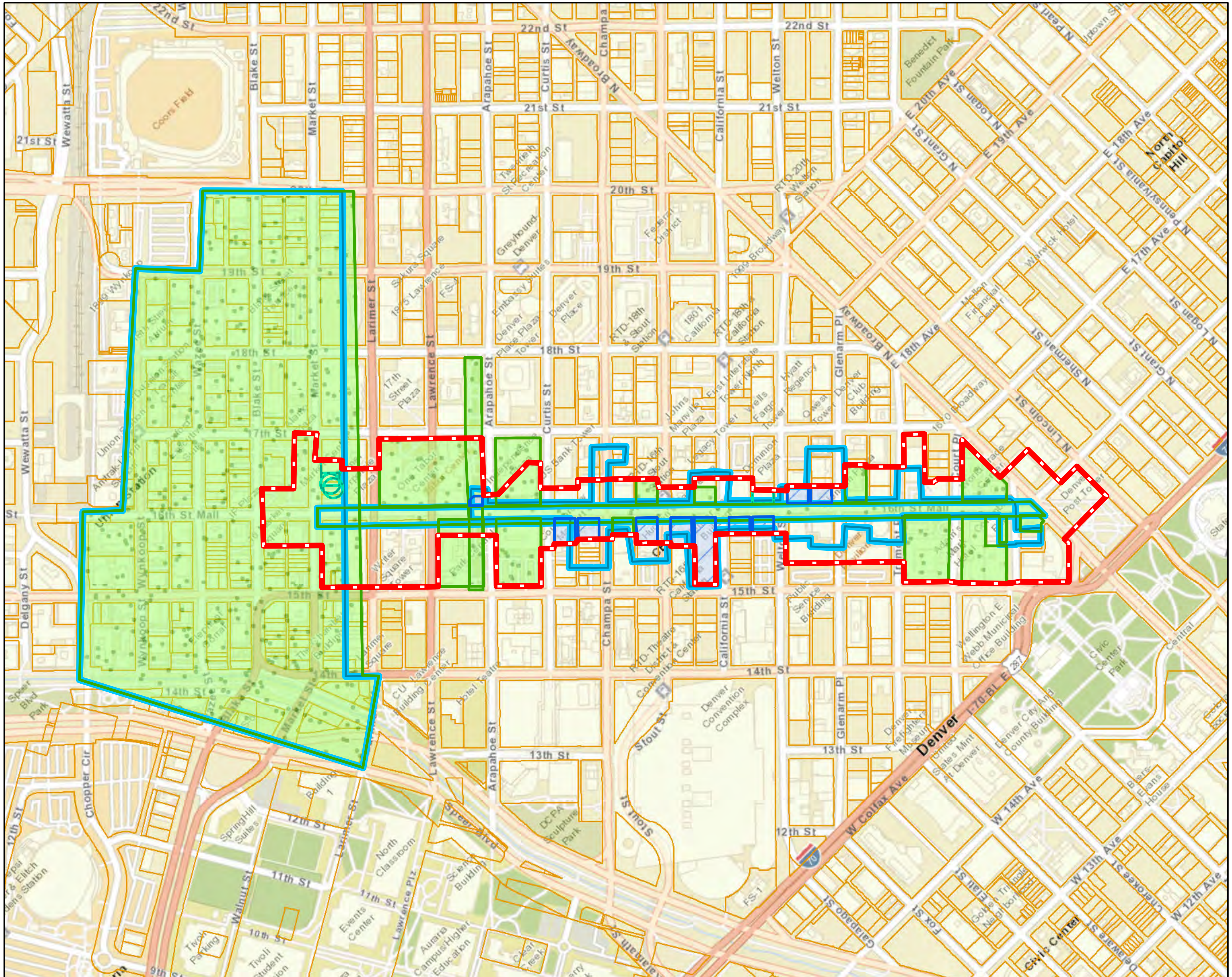
National Trust for Historic Preservation

_____ Date
[insert name and title]

Lower Downtown Design Review Board

_____ Date
[insert name and title]

ATTACHMENT 1
Area of Potential Effects and Locations of Historic Properties



VICINITY MAP

LEGEND

- Area of Potential Effects
- Parcel Boundary

Historic Properties

NRHP Status

- Listed on NRHP
- Eligible for NRHP

Historic Districts

- Eligible for NRHP
- Contributes to Historic District

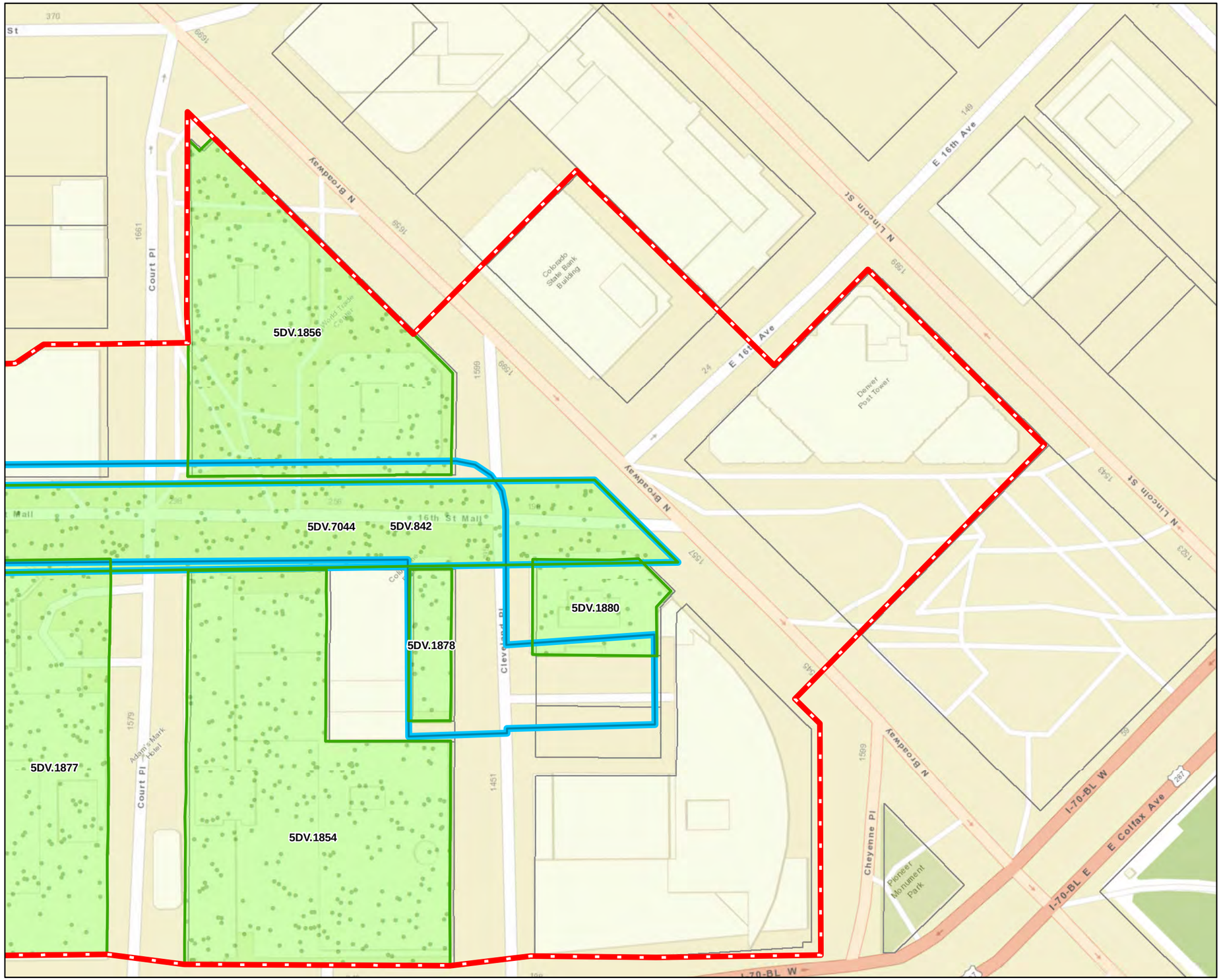
0 600
Feet

Overview
Identified Historic Properties

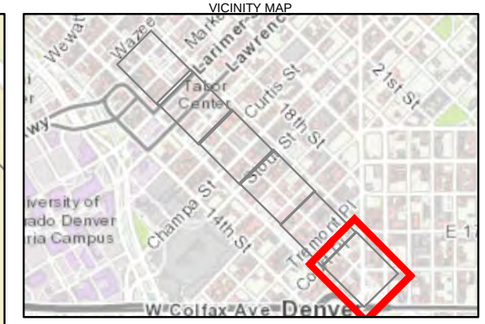
16th Street Mall

March 2018

ch2m



VICINITY MAP



LEGEND

- Area of Potential Effects
- Parcel Boundary

Historic Properties

NRHP Status

- Listed on NRHP
- Eligible for NRHP

Historic Districts

- Eligible for NRHP
- Contributes to Historic District

N

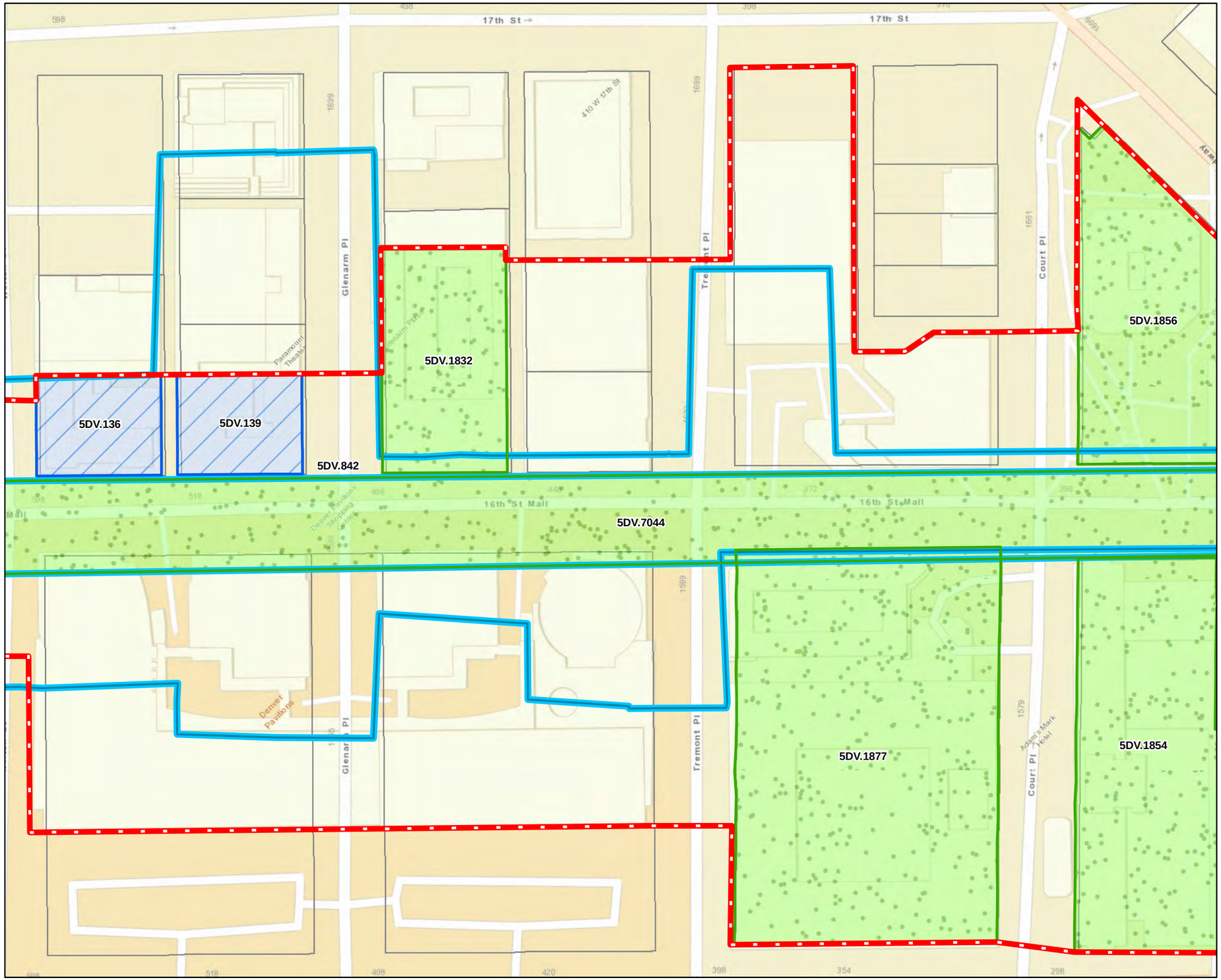
0 100
Feet

Map Book 1
Identified Historic Properties

16th Street Mall

March 2019

ch2m



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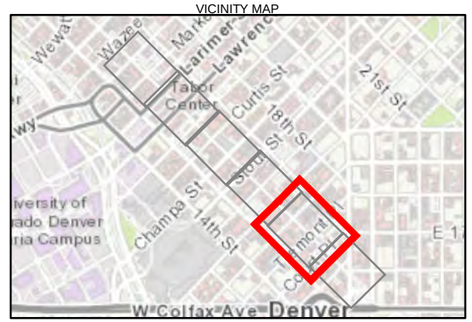


LEGEND

- Area of Potential Effects
- Parcel Boundary

Historic Properties

NRHP Status

- Listed on NRHP
- Eligible for NRHP

Historic Districts

- Eligible for NRHP
- Contributes to Historic District

N

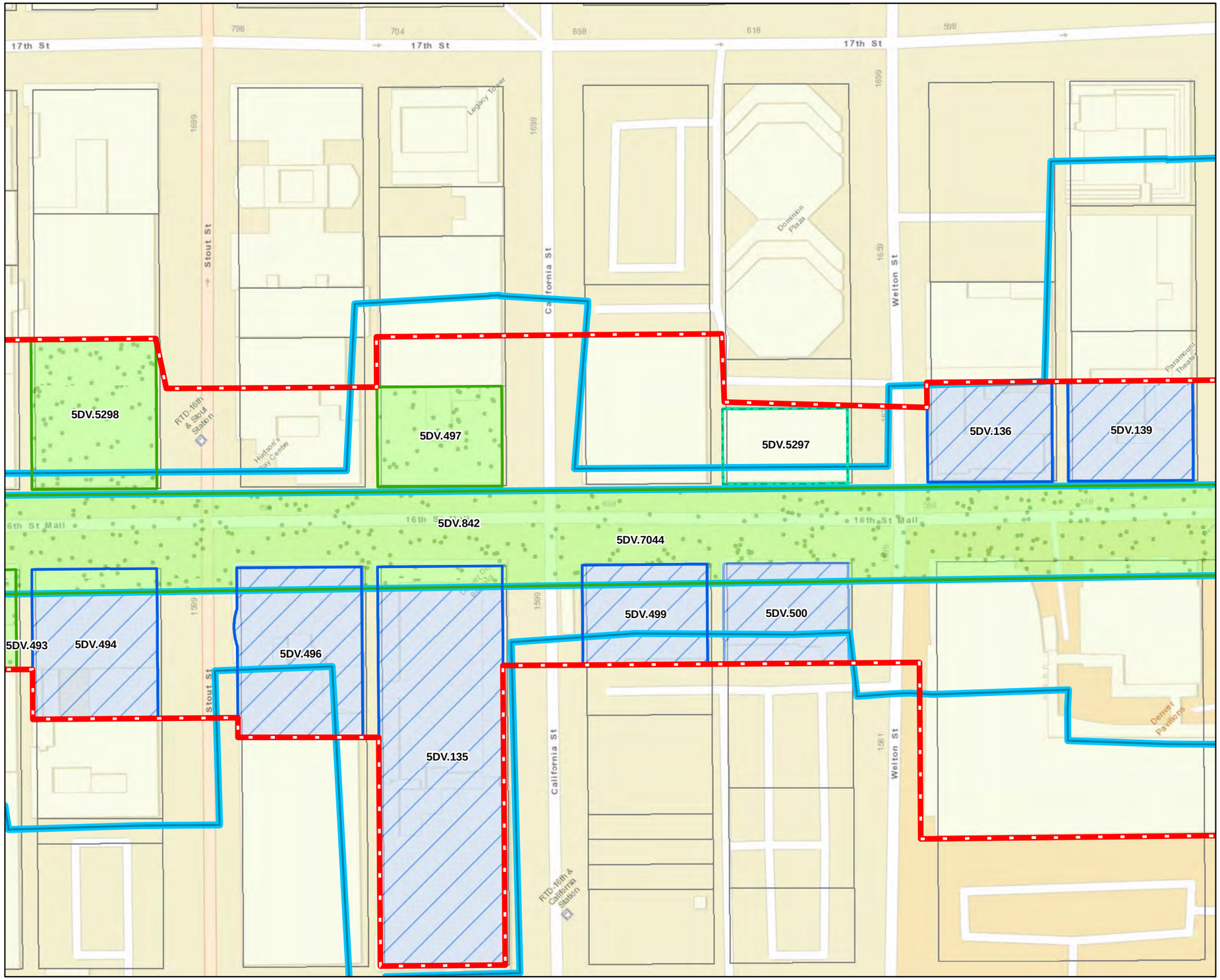
0 100
Feet

Map Book 2
Identified Historic Properties

16th Street Mall

March 2019

ch2m



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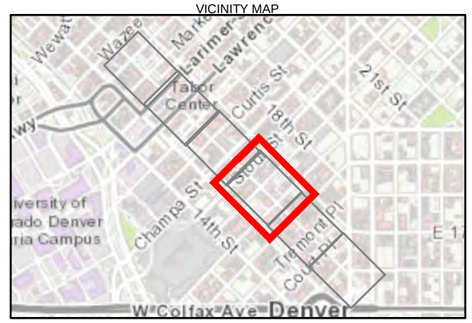


LEGEND

- Area of Potential Effects
- Parcel Boundary

Historic Properties

NRHP Status

- Listed on NRHP
- Eligible for NRHP

Historic Districts

- Eligible for NRHP
- Contributes to Historic District

N

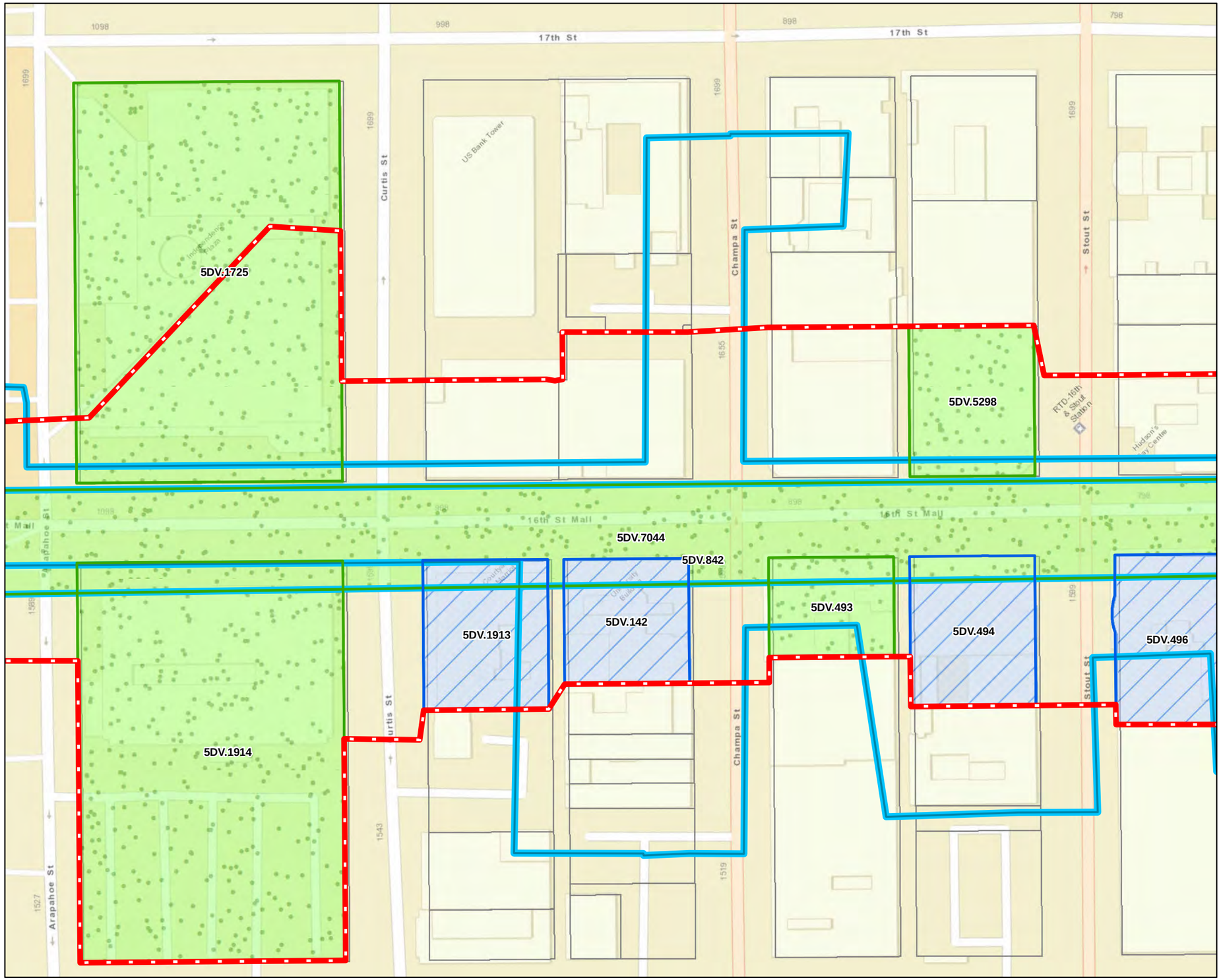
0 100
Feet

Map Book 3
Identified Historic Properties

16th Street Mall

March 2019

ch2m



VICINITY MAP

LEGEND

- Area of Potential Effects
- Parcel Boundary

Historic Properties

NRHP Status

- Listed on NRHP
- Eligible for NRHP

Historic Districts

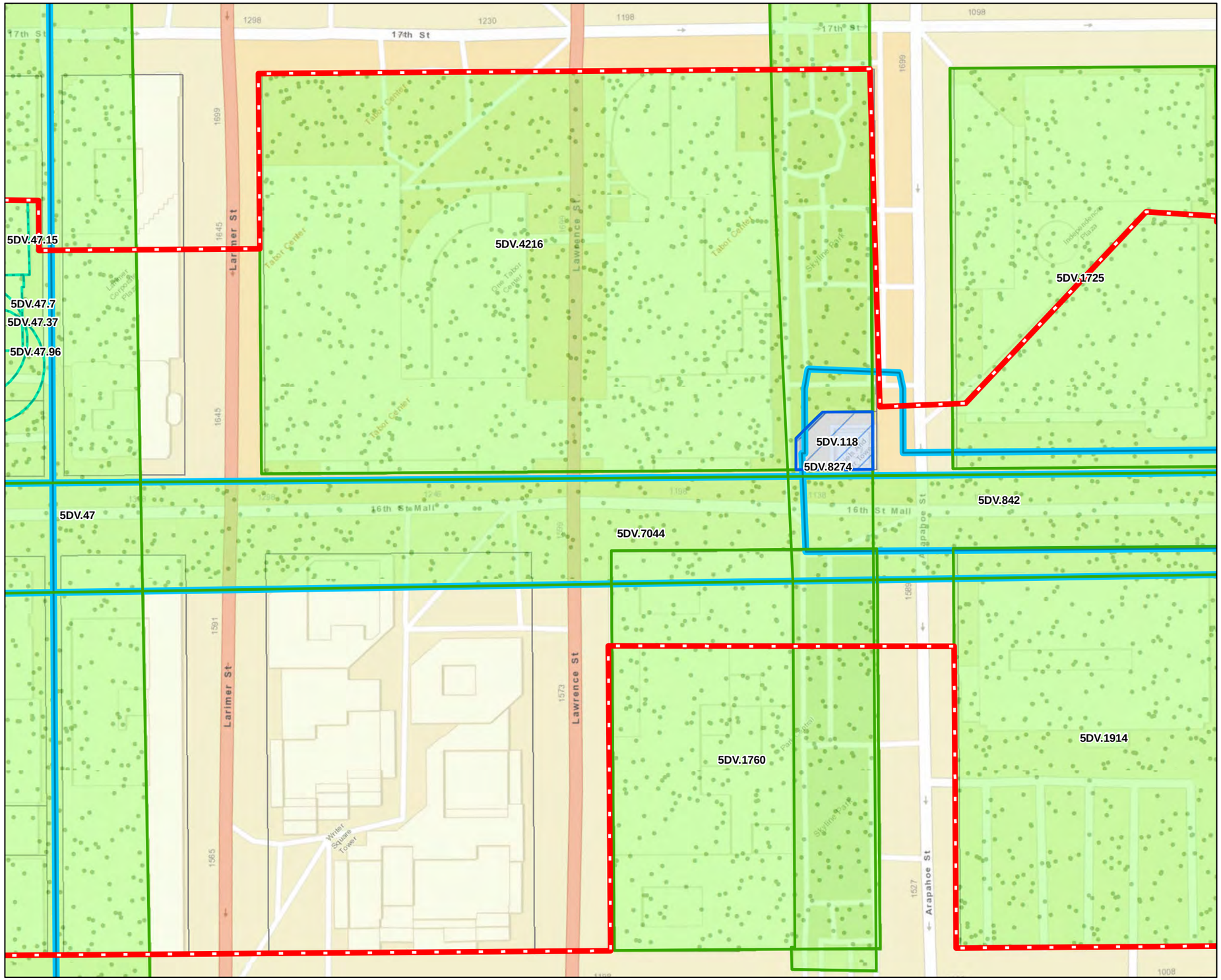
- Eligible for NRHP
- Contributes to Historic District

0 100
Feet

Map Book 4
Identified Historic Properties

16th Street Mall

March 2019



VICINITY MAP

LEGEND

- Area of Potential Effects
- Parcel Boundary

Historic Properties

NRHP Status

- Listed on NRHP
- Eligible for NRHP

Historic Districts

- Eligible for NRHP
- Contributes to Historic District

N

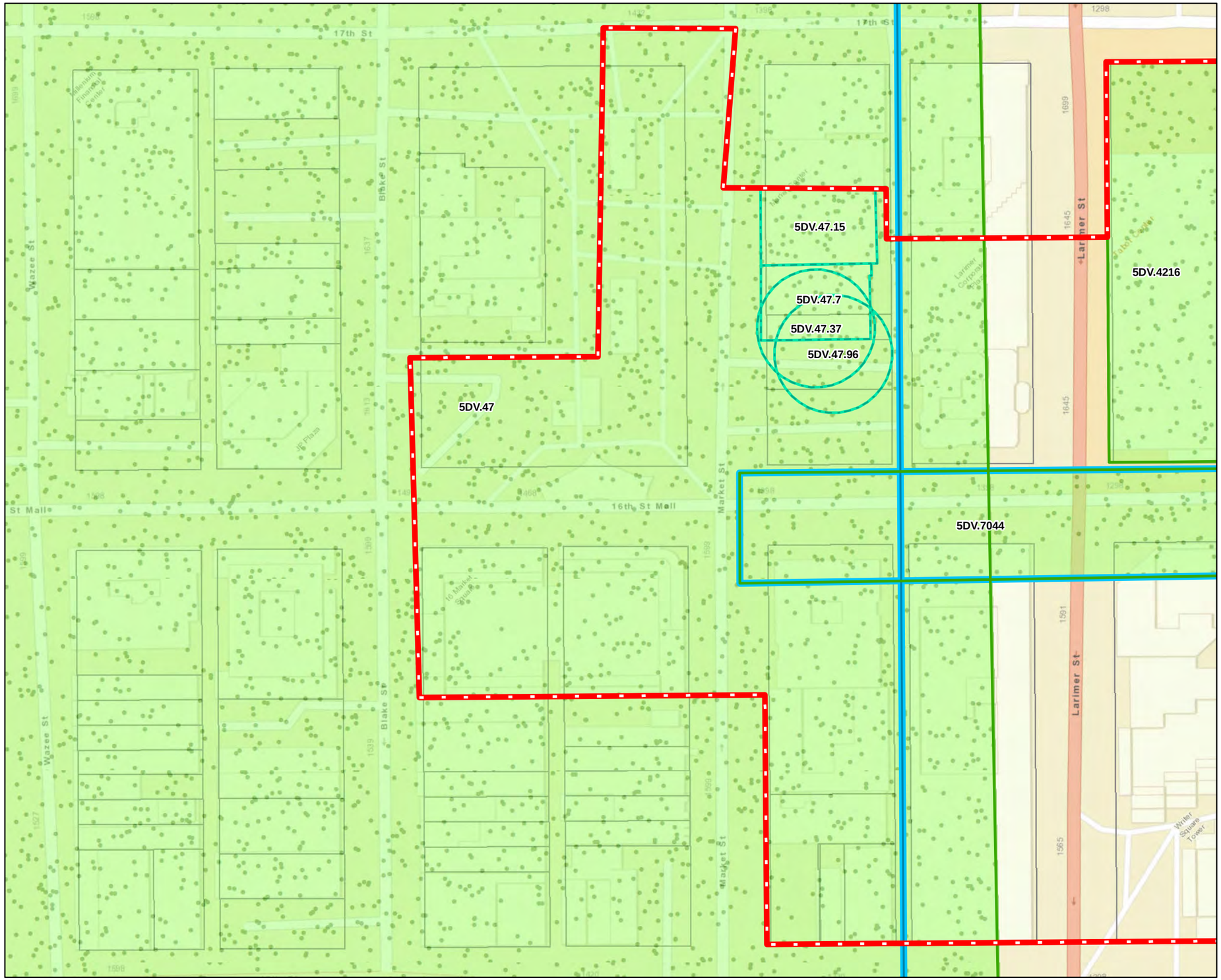
0 100
Feet

Map Book 5
Identified Historic Properties

16th Street Mall

March 2019

ch2m



VICINITY MAP

LEGEND

- Area of Potential Effects
- Parcel Boundary

Historic Properties

NRHP Status

- Listed on NRHP
- Eligible for NRHP

Historic Districts

- Eligible for NRHP
- Contributes to Historic District

N

0 100
Feet

Map Book 6
Identified Historic Properties

16th Street Mall

March 2019

ch2m.

ATTACHMENT 2
Summary of Historic Properties within the Area of Potential Effects

ATTACHMENT 2

TABLE OF IDENTIFIED HISTORIC PROPERTIES WITHIN THE AREA OF POTENTIAL EFFECTS

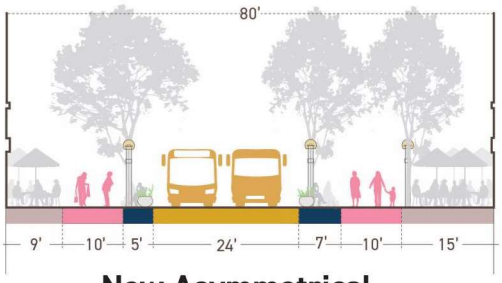
Site ID	Site Name	Address	NRHP Eligibility Status	Finding of Effect
5DV.118	Daniels & Fisher Tower	1101 16th Street; 1601 Arapahoe Street	Listed on NRHP	No Adverse Effect
5DV.135	Denver Dry Goods Company Building	702 16th Street; California Street; and 16th Street	Listed on NRHP	No Adverse Effect
5DV.136	Masonic Temple Building	1614 Welton Street, 535 16th Street	Listed on NRHP	No Adverse Effect
5DV.139	Kittredge Building	511 16th Street	Listed on NRHP	No Adverse Effect
5DV.142	A.C. Foster Building; University Building	910-918 16th Street	Listed on NRHP	No Adverse Effect
5DV.1725	Independence Plaza Prudential Plaza	1001 16th St. 1050 17th St.	NRHP-eligible	No Adverse Effect
5DV.1760	Bridgepoint Plaza; Park Central	1110 16th Street; 1515 Arapahoe Street; 1111 15th Street	NRHP-eligible	No Adverse Effect
5DV.1832	Security Life Building; 1600 Glenarm Place	1616 Glenarm Place	NRHP-eligible	No Adverse Effect
5DV.1854	Hilton Hotel; Radisson Hotel; Adams Mark Hotel	1550 Court Place	NRHP-eligible	No Adverse Effect
5DV.1856	Dome Tower; Great West Plaza; World Trade Center	1625 Broadway	NRHP-eligible	No Adverse Effect
5DV.1877	Zeckendorf Plaza; May D & F Plaza; Hyperbolic Paraboloid	350 16th Street; 1550 Court Place	NRHP-eligible	No Adverse Effect
5DV.1878	Colorado Federal Savings	200 16th Street	NRHP-eligible	No Adverse Effect
5DV.1880	Petroleum Club Building; Petroleum Building; 110 Building	110 16th Street	NRHP-eligible	No Adverse Effect

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

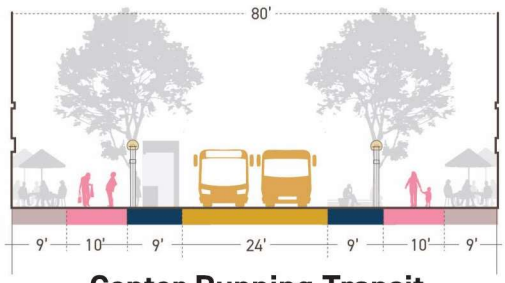
Site ID	Site Name	Address	NRHP Eligibility Status	Finding of Effect
5DV.500	Steel Building; Fontius Building; Sage Building	1555 Welton; 600 16th Street	Listed on NRHP	No Adverse Effect
5DV.5297	Liebhardt Building; Cottrell Clothing Company	601 16th Street	Listed on NRHP	No Adverse Effect
5DV.5298	Walgreens	801 16th Street	NRHP-eligible	No Adverse Effect
5DV.7044	16th Street Mall	1-1300 16th Street	NRHP-eligible	No Adverse Effect
5DV.8274	Skyline Park	1500-1800 Arapahoe Street	NRHP-eligible	No Adverse Effect
5DV.842	16th Street Historic District	Multiple	NRHP-eligible	No Adverse Effect
5.DV.9217.1	Denver Tramway Trolley Lines archeological site	Broadway	NRHP-eligible	No Historic Property Affected

ATTACHMENT 3
Design Drawings

LPA Plan and Typical Section



New Asymmetrical

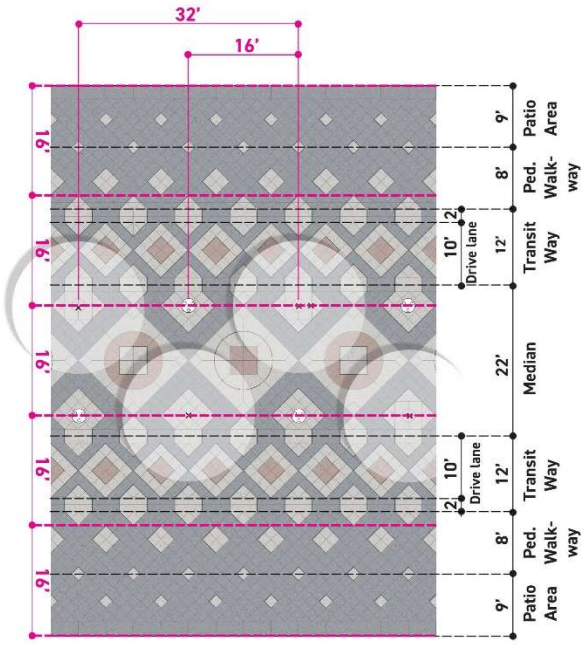


Center Running Transit

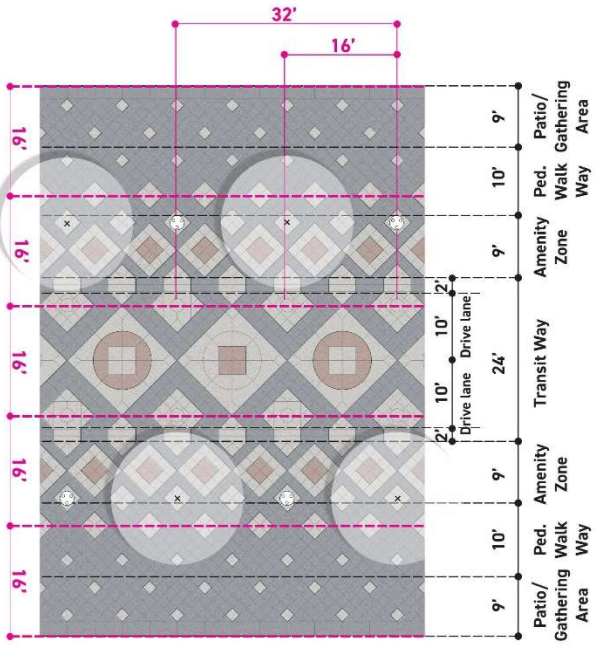
Legend

- Transit Way
- Amenity Zone
- Pedestrian Walkway
- Patio/Gathering Area

Existing and LPA Symmetrical Block Pattern



Existing Median

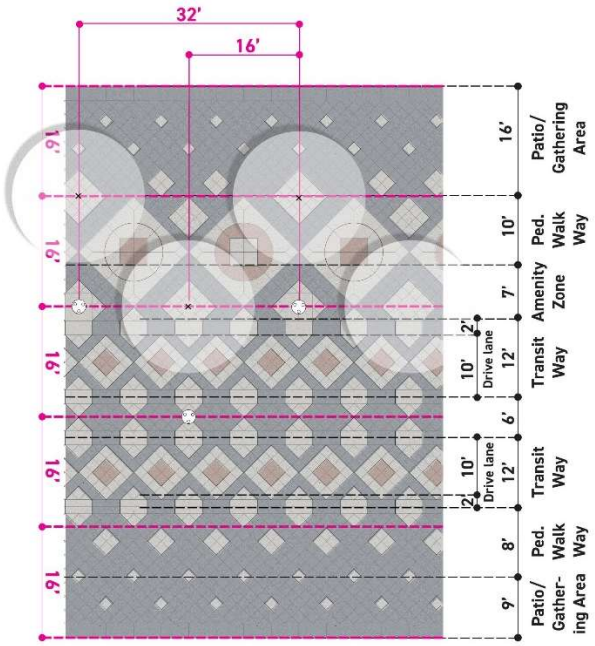


Proposed Center Running

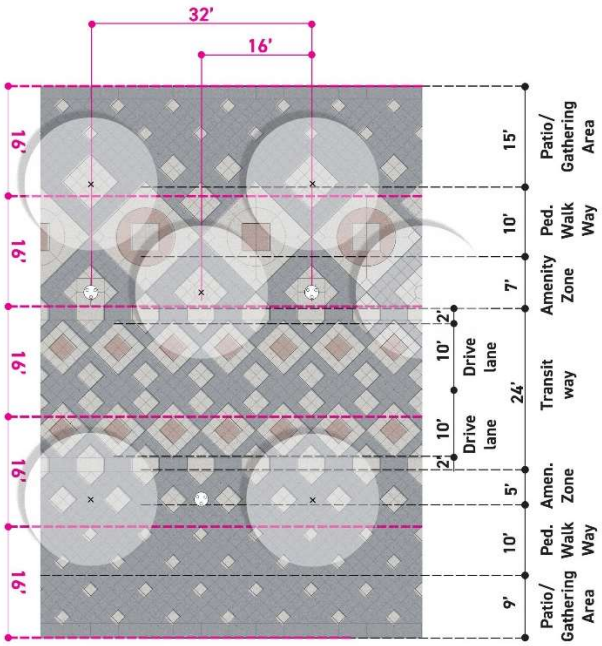
Legend

- Historic Replica Light Standard
- Granite Paver Unit - Diamond (colors vary)
- Granite Special Unit - Abutting Curbs/Drains (colors vary)
- Granite Special Unit - Transit Way Delineation (colors vary)

Existing and LPA Asymmetrical Block Pattern



Existing Asymmetrical

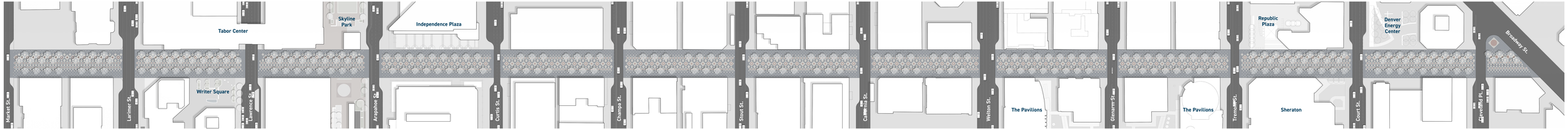


LPA New Asymmetrical

Legend

- Historic Replica Light Standard
- Granite Paver Unit - Diamond (colors vary)
- Granite Special Unit - Abutting Curbs/Drains (colors vary)
- Granite Special Unit - Transit Way Delineation (colors vary)

Locally Preferred Alternative



THE MALL EXPERIENCE
THE FUTURE OF DENVER'S 16TH STREET MALL
DESIGN & IMPLEMENTATION

Tree Candidates

Honeylocust and Similar

ID	Family	Botanical Name	Acceptable Cultivar	Common Name	Hardiness Zone	Moisture Level	Soil Salt Tolerance	Aerosol Salt Tolerance	Water Quality Area	Height at Maturity	Canopy Spread at Maturity	Growth Form/ Shape	Flowers	Leaf Color – Spring	Leaf Color – Fall	Subject to Change[a]	Additional Notes (includes compaction/tolerances/restrictions)
49	Bignoniaceae	Catalpa speciosa	–	Western Catalpa	5	Xeric to Min	Intermediate	Intermediate	Yes	50	35	Irregular pyramidal to rounded oval	Large, white flowers in spring to summer; showy	Green	Yellow	No	Heat, drought, and alkaline soil tolerant. Decay when wounded or as tree ages may be an issue.
15	Fabaceae	Gleditsia triacanthos inermis	Harve	Northern Acclaim Honeylocust	3b	Xeric	Tolerant	Tolerant	Yes	40	30	Broad pyramidal	Insignificant	Green	Yellow	No	Thornless and fruitless cultivar. Genus overplanted in Denver region.
7	Fabaceae	Gymnocladus dioicus	Espresso	Kentucky Coffeetree	4	–	Tolerant	Tolerant	Yes	–	–	Spreading vase	Greenish-white clusters in late spring	Blue-green	Yellow	Yes	Male (fruitless) cultivar. Tolerant of urban growing conditions. No known insect or disease issues. Leaves, seeds, and pulp reported to be poisonous if ingested.
16	Fabaceae	Gleditsia triacanthos inermis	Shademaster	Shademaster Honeylocust	4	Xeric	Tolerant	Tolerant	Yes	40	30	Vase to rectangular	Insignificant	Green	Yellow	Yes	Thornless and fruitless cultivar. Central leader less present than Skyline. Genus overplanted in Denver region.
52	Platanaceae	Platanus occidentalis	Bismarck	Northern Advance American Sycamore	3	Mod	Intermediate	Intermediate	Yes	75	60	Pyramidal to rounded	Insignificant	Green	Yellow	No	Cold hardy cultivar of parent species. Large root system requires large tree lawn. NDSU introduced – availability may be limited.
54	Platanaceae	Platanus x acerifolia	Morton Circle	Exclamation London Planetree	5	Mod	Intermediate	Intermediate	Yes	50	30	Pyramidal	Insignificant	Green	Yellow	No	Upper branches display showy bark. Cultivar more resistant to anthracnose than parent species. Large root system requires large tree lawn.
18	Sapindaceae	Koelreuteria paniculata	–	Goldenraintree	5	Xeric	Intermediate	Intermediate	Yes	30	30	Open, rounded vase	Yellow in summer, very showy	Green	Yellow	No	Volunteer seedlings could be an issue in mulched areas.
34	Fabaceae	Styphnolobium japonica	Halka	Millstone Japanese Pagodatree	5	Min	Intermediate	Intermediate	Yes	40	30	Broad oval to rounded	Creamy white in summer, showy	Dark green	Yellow	Yes	Tolerant of urban conditions, including heat, drought, and compacted soils. More upright branching habit than parent species. Greatest canker resistance of pagodatree species.
126	Rutaceae	Phellodendron amurense	Macho	Macho Amur Corktree	4	Min to mod	Intermediate	Intermediate	No	40	40	Upright to rounded	Green-white in spring, insignificant	Green	Yellow	No	Male, seedless cultivar of parent species. Large, shallow root system requires large tree lawn.

Shade Trees

ID	Family	Botanical Name	Acceptable Cultivar	Common Name	Hardiness Zone	Moisture Level	Soil Salt Tolerance	Aerosol Salt Tolerance	Water Quality Area	Height at Maturity	Canopy Spread at Maturity	Growth Form/ Shape	Flowers	Leaf Color – Spring	Leaf Color – Fall	Subject to Change[a]	Additional Notes (includes compaction/tolerances/restrictions)
11	Fagaceae	Quercus macrocarpa	JFS-KW14	Cobblestone Oak	3	Xeric	Intermediate	Intermediate	Yes	50	40	Broad oval	Insignificant	Dark green	Yellow	No	Bark displays more cork-like features than parent species.
130	Fagaceae	Quercus muehlenbergii	–	Chinkapin Oak	3	Mod	Intermediate	Intermediate	No	45	50	Upright oval to rounded	Insignificant	Yellow-green	Yellow	Yes	Tolerant of alkaline soils. Transplant in spring for best survival. Prune to develop central leader.
31	Ulmaceae	Celtis laevigata	All Seasons, Magnifica	Sugar Hackberry	5	Xeric to Min	Tolerant	Intermediate	Yes	45	40	Rounded vase to broad oval	Green in spring, insignificant	Dark green	Yellow	No	Varieties are more hardy than parent species. Magnifica has similar growth habit to elm and improved insect resistance.
47	Ulmaceae	Celtis occidentalis	Chicagoland	Common Hackberry	3	Xeric to Min	Tolerant	Intermediate to Sensitive	Yes	45	35	Rounded vase, strong central leader	Green in spring, insignificant	Green	Yellow	Yes	Tolerant of urban growing conditions. Nipple gall may be an aesthetic issue. Intolerant of mechanical damage. Transplant in spring (B&B).
25	Ulmaceae	Ulmus americana	Princeton	Princeton American Elm	4	Mod	Intermediate	Intermediate	Yes	60	45	Upright vase	Insignificant	Dark glossy green	Yellow	Yes	Fast growing cultivar. Resistant to Dutch elm disease and elm leaf beetle. Per CSU elm trials, tree may susceptible to scale. Prune to develop strong branching structure.
30	Ulmaceae	Ulmus (wilsoniana x pumila Accolade) x carpinifolia x glabra	Patriot	Patriot Elm	4	Mod	Tolerant	Tolerant	Yes	45	35	Upright, narrow vase	Insignificant	Dark green	Yellow	No	Fast growth rate. Highly resistant to Dutch elm disease. Per CSU elm trials, tree may be susceptible to scale. Not as drought tolerant as other hybrids. Prune to develop strong branching structure.
29	Ulmaceae	Ulmus glabra x carpinifolia	Pioneer	Pioneer Elm	4	Mod	Tolerant	Tolerant	Yes	50	45	Rounded	Insignificant	Dark green	Yellow	Yes	Resistant to Dutch elm disease. Highly susceptible to elm leaf beetle. Per CSU elm trials, tree may be susceptible to scale. Prune to develop strong branching structure.
23	Ulmaceae	Ulmus pumila x japonica x wilsoniana	Morton Glossy	Triumph Elm	4	Min to mod	Tolerant	Tolerant	Yes	50	40	Upright oval to vase	Insignificant	Dark glossy green	Yellow	No	Cold hardy. Excellent resistance to Dutch elm disease. Resistant to elm leaf beetle. Per CSU elm trials, tree may be moderately resistant to scale. Prune to develop strong branching structure.
24	Ulmaceae	Ulmus japonica x wilsoniana	Morton	Accolade Elm	4	Min to mod	Intermediate	Intermediate	Yes	60	50	Vase with arching limbs	Insignificant	Dark glossy green	Yellow	Yes	Cold hardy. Resistant to Dutch elm disease and elm leaf beetle. Per CSU elm trials, tree shows high scale resistance. Prune to develop strong branching structure.
92	Ulmaceae	Ulmus davidiana var. japonica	Discovery	Discovery Elm	3	Mod	Tolerant	Tolerant	No	40	30	Upright oval to arching vase	Insignificant	Dark green	Yellow	Yes	Slow growing, cold hardy variety. Resistant to Dutch elm disease and elm leaf beetle. Resitance to scale unknown. Large root system requires large tree lawn. Growth habit requires consistent crown-thinning. Prune to develop strong branching structure.
91	Ulmaceae	Ulmus pumila x hollandica x carpnifolia	Homestead	Homestead Elm	5	Min to mod	Tolerant	Tolerant	No	50	30	Pyramidal to oval	Insignificant	Dark green	Yellow	No	Fast growth rate. Resistant to Dutch elm disease. Susceptible to elm leaf beetle. Per CSU elm trials, tree may be moderately resistant to scale. Prune to develop strong branching structure.

THE MALL EXPERIENCE — THE FUTURE OF DENVER'S 16TH STREET MALL — DESIGN & IMPLEMENTATION

Tree Candidates

Asymmetrical – Red Oak and Similar

ID	Family	Botanical Name	Acceptable Cultivar	Common Name	Hardiness Zone	Moisture Level	Soil Salt Tolerance	Aerosol Salt Tolerance	Water Quality Area	Height at Maturity	Canopy Spread at Maturity	Growth Form/ Shape	Flowers	Leaf Color – Spring	Leaf Color – Fall	Subject to Change[a]	Additional Notes (includes compaction/tolerances/restrictions)
85	Aceraceae	Acer buergeranum	Streetwise	Trident Maple	5	Min	Tolerant	Intermediate	No	30	30	Oval to rounded	Small green-yellow in spring, insignificant	Dark green	Orange-red	Yes	Slow growing. No pests or disease problems at this time. Snow and ice damage may be a concern.
86	Aceraceae	Acer campestre	–	Hedge Maple	5	Min	Tolerant	Tolerant	No	30	30	Oval to rounded, dense	Small green-yellow in spring, insignificant	Dark green	Yellow	Yes	Tolerates dry soil. Intolerant of soil compaction. Prune to develop strong branching structure and overhead clearance.
3	Aceraceae	Acer miyabei	Morton	State Street Maple	4	Mod	Intermediate	Intermediate	Yes	45	35	Upright pyramidal to rounded	Small green-yellow in spring, insignificant	Green	Yellow-orange	Yes	Cold hardy and drought tolerant, chlorosis resistant; pest free.
101	Hippocastana-ceae	Aesculus x Bergeson	–	Prairie Torch Buckeye	3	Mod	Intermediate	Intermediate	No	27	27	Slightly weeping, globose	Yellow-green in spring, showy	Dark green	Orange-red	No	Excellent cold hardiness. Resistant to leaf scorch. Intolerant of drought.
100	Hippocastana-ceae	Aesculus x 'Homestead'	–	Homestead Buckeye	4	Mod	Intermediate	Unknown	No	35	22	Broad oval to rounded, low branching	Yellow-red flowers in spring, showy	Dark green	Bright red-orange	No	Intolerant of excess heat and drought. Powdery mildew, leaf scorch, and leaf drop may be issues. Prune to develop overhead clearance.
62	Rosaceae	Pyrus calleryana	Glen's Form	Chanticleer Pear	4	Min to Mod	Intermediate	Intermediate	Yes	30	15	Upright pyramidal	White in spring, showy	Glossy green	Red	Yes	Greater fireblight resistance than other cultivars. Overplanting is a concern. Prune to develop strong branching structure
118	Fagaceae	Quercus alba	–	White Oak	3	Mod	Tolerant	Tolerant	No	60	60	Oval to rounded	Insignificant	Green	Copper-orange	Yes	Relatively slow growing. May be intolerant of alkaline soils. Chlorosis may be an issue.
115	Fagaceae	Quercus buckleyi	–	Texas Red Oak	5b	Min	Tolerant	Unknown	No	35	35	Broad rounded	Insignificant	Glossy green	Orange-red	No	Native of Texas is closely related to shumard oak. Tolerant of alkaline soils and drought. Check seed source for hardiness and soil tolerance.
112	Fagaceae	Quercus robur x alba	Tabor PP21382	Forest Knight Oak	4	Xeric to Min	Intermediate	Tolerant	No	45	35	Broad oval	Insignificant	Glossy dark green	Orange-red	No	Columnar hybrid of English and white oak. Tolerant of urban conditions. Kermes scale may be an issue.
121	Fagaceae	Quercus shumardii	–	Shumard Oak	5	Mod	Intermediate	Intermediate	No	60	40	Pyramidal to oval	Insignificant	Green	Orange-red	No	Due to large growth range, source as locally as possible for pH, drought, and hardiness tolerance. Large root system requires large tree lawn. Prune to develop central leader.
96	Fagaceae	Quercus x bimundorum	Midwest	Prairie Stature Oak	3	Min to Mod	Intermediate	Intermediate	No	45	35	Broad pyramidal	Insignificant	Insignificant	Dark green	Yes	Cold hardy hybrid of English and white oak. Tolerant of alkaline soils.
120	Ulmaceae	Ulmus davidiana var. japonica	Burgundy Glow	Northern Empress Japanese Elm	3	Mod	Tolerant	Tolerant	No	28	24	Rounded, open	Insignificant	Green	Red	No	Medium growth rate. Resitant to Dutch elm disease and elm leaf beetle. Resistance to scale unknown. Prune to develop strong branching structure.
4	Ulmaceae	Ulmus parvifolia	Dynasty	Dynasty Elm	5	Mod	Intermediate	Intermediate	Yes	35	35	Vase	Insignificant	Green	Yellow-orange	No	Fast growth rate. Resistance to Dutch elm disease, scale, and elm leaf beetle unknown. Prune to develop strong branching structure. Availability may be limited. Unproven in Denver region.
63	Ulmaceae	Ulmus parvifolia	Emer II PP7552	Allee Lacebark Elm	5	Mod	Intermediate	Intermediate	Yes	45	30	Upright vase with arching limbs	Insignificant	Green	Orange-red	Yes	High resistance to Dutch elm disease and elm leaf beetle. Resistance to scale unknown. Thin, showy bark. Prune to develop strong branching structure.
64	Ulmaceae	Ulmus parvifolia	Corticosa	Cork Bark Elm	6	Mod	Intermediate	Intermediate	Yes	40	40	Vase	Insignificant	Dark green	Orange	No	Resistance to Dutch elm disease, scale, and elm leaf beetle unknown. Prune to develop strong branching structure. Cold hardiness may be an issue. Availability may be limited. Unproven in Denver region.
5	Ulmaceae	Zelkova serrata	Halka	Halka Zelkova	5b	Xeric to Mod	Intermediate	Intermediate	Yes	50	35	Upright vase, open & loose form	Insignificant	Green	Yellow-orange	No	Growth rate is fastest of zelkova cultivars. Tolerant of urban conditions. Susceptible to canker from mechanical injury. Plant in spring. Prune in fall to develop strong branching structure.
65	Ulmaceae	Zelkova serrata	Green Vase	Green Vase Zelkova	5b	Xeric to Mod	Intermediate	Intermediate	Yes	45	30	Vase, upright arching branches	Insignificant	Green	Orange	No	Faster growth rate, but less cold hardy than Village Green. Tolerant of urban conditions. Susceptible to canker from mechanical injury. Plant in spring. Prune in fall to develop strong branching structure.
2	Ulmaceae	Zelkova sinica	–	Chinese Zelkova	5b	Xeric to Mod	Intermediate	Intermediate	Yes	35	35	Vase	Insignificant	Dark green	Yellow-orange	No	Resistant to elm leaf beetle. Exfoliating cinnamon-colored bark. Prune in fall to develop strong branching structure. Availability may be limited. Unproven in Denver region.

[a] Trees are subject to change based on design changes, Department of Forestry recommendations, and availability.

Note: The tree species listed are preliminary candidates for future use on the 16th Street Mall, based on design and health/resiliency criteria. Criteria are subject to change based on design changes, Department of Forestry recommendations, and availability.

ATTACHMENT 4
Unanticipated Discoveries Plan

DRAFT

Unanticipated Discovery Plan for 16th Street Mall Denver, Denver County, Colorado

December 2018

Contents

Acronyms and Abbreviations

ARPA	Archeological Resources Protection Act
CCD	City and County of Denver
CFR	Code of Federal Regulations
CO	Colorado
Council	Advisory Council on Historic Preservation
CRS	Colorado Revised Statutes
DDP	Downtown Denver Partnership
FTA	Federal Transit Administration
LA	Louisiana
MOA	Memorandum of Agreement
NAGPRA	Native American Graves Protection and Repatriation Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NRHP	National Register of Historic Places
Project	Improvements to the 16th Street Mall, Denver, Colorado
QPA	Qualified Professional Archeologist
RTD	Regional Transportation District
SHPO	State Historic Preservation Officer
UDP	Unanticipated Discovery Plan
U.S.C.	United States Code

SECTION 1

Unanticipated Discovery Plan

The Federal Transit Administration (FTA), as the lead federal agency, has determined that the Improvements to the 16th Street Mall (Project) constitute an Undertaking under 36 Code of Federal Regulations (CFR) 800.16(y), which requires compliance with Section 106 of the National Historic Preservation Act (NHPA) (54 United States Code [U.S.C.] § 306108) and its implementing regulations in 36 CFR Part 800.

FTA, in coordination with the Regional Transportation District (RTD) and the City and County of Denver (CCD), proposes to implement improvements to the 16th Street Mall (Mall). The Project proposes to develop and implement a flexible and sustainable design for the Mall to address deteriorating infrastructure, provide equitable and sufficient space for high-quality public gathering opportunities, improve pedestrian and vehicle safety, and continue safe and accessible two-way transit shuttle service on the Mall while honoring the Mall's use and iconic design through improved drainage, realignment of the 16th Street Mall's asymmetrical ends, relocation of the transit lanes, conversion of the current median to transit lanes, installation of new street furniture and fixtures, and replacement of the existing granite pavers with new granite pavers;

The FTA is the lead federal agency responsible for the Undertaking and for ensuring that the requirements of Section 106 of the NHPA are fulfilled in accordance with 36 CFR Part 800. Following Section 106 consultation with the Colorado State Historic Preservation Officer (SHPO), identified federally recognized tribes, local consulting parties, and the FTA, it was determined that the Mall is eligible for the National Register of Historic Places (NRHP). The FTA has determined that the Undertaking will result in an adverse effect on the 16th Street Mall historic property.

There is Memorandum of Agreement (MOA) among the FTA, Advisory County on Historic Preservation (Council), and Colorado SHPO to record the resolution measures to resolve the adverse effect to the Mall; the CCD and RTD are Invited Signatories to the MOA. Stipulation IX of the MOA requires that in the event of an unanticipated discovery of cultural resources or historic properties during Project implementation, the CCD will proceed in accordance with the procedures outlined in an Unanticipated Discovery Plan (UDP) and notify the FTA and other signatories. Therefore, this UDP has been developed for use during improvements to the 16th Street Mall.

This UDP will be implemented if new or additional historic properties or cultural resources are encountered during construction, related excavation, or other ongoing activities on the proposed Undertaking. For the purposes of this UDP, cultural resources may include archaeological resources (any site that contains material remains of past human life or activities), historic structures, (any building or structure greater than 50 years of age), linear features (such as a rail line), or other items that possess cultural importance to individuals or a group.

This UDP has been developed through reference to the regulations embodied in the Protection of Historic Properties issued by the Council (revised August 2004, https://www.achp.gov/sites/default/files/regulations/2017-02/regs-rev04.pdf. CH2M HILL

Engineers, Inc. (CH2M), now part of Jacobs Engineering Group, Inc., reviewed Colorado legislation (Colorado Revised Statues CRS 24-80-401-411 and CRS 24-80-1301-1305, as well as 8 Colorado Code of Regulations 1504-7) that was used in the development of this UDP.

1.1 Procedure when Cultural Materials are Observed

Termed "unanticipated discovery" or "post-review discovery," the identification of new or additional cultural resources during implementation of an undertaking typically occurs in the case of projects that involve excavation or ground-disturbing activities. The following measures will be implemented if an unanticipated cultural resource discovery is made by CCD, RTD, Downtown Denver Partnership (DDP), FTA, CH2M, any other contractor, or any subcontractor during construction of the proposed Undertaking:

1. Construction activities or related excavation within 30 feet of an unanticipated discovery will be halted and the discovery protected from further disturbance.
2. Within 24 hours of an unanticipated discovery, CCD will notify by telephone the FTA and Colorado SHPO and, in the case of human remains, the Denver County coroner and sheriff.
3. CCD will consult with the FTA and SHPO on the most appropriate course of action for treatment of the unanticipated discovery. This may involve further archaeological study to record, document, or evaluate potential NRHP-eligibility of the inadvertently discovered cultural resources.
4. Specific FTA and SHPO instructions concerning an unanticipated discovery resulting from the notification as previously described will be followed by an Qualified Professional Archaeologist (QPA) or will be under the direct supervision of a person or persons who meet(s) or exceed(s) the pertinent qualifications in the Secretary of the Interior's Professional Qualification Standards (48 CFR §§44738-44739) in those areas in which the qualifications are applicable for the specific work performed.
5. At a minimum, sufficient archaeological work will be performed on the unanticipated discovery location to stabilize deposits, protect deposits from scavengers or looters, and collect readily available samples (for example, for radiocarbon dating), which may help pinpoint the age of deposits.
6. FTA will also consult with any consulting Indian tribes that may ascribe traditional cultural and religious significance to affected historic properties.
7. If neither the SHPO, consulting parties, nor consulting tribes submit any objection to FTA's plan for addressing the discovery within 48 hours, FTA may carry out the requirements of 36 CFR 800.13, and the Council need only be notified in the event there is an adverse effect.
8. Construction activities will remain halted in the area of the unanticipated discovery until the FTA and SHPO indicate that it may proceed in the area of a specific unanticipated discovery and the requirements of 36 CFR 800.13 have been fulfilled.

1.2 Procedure for Discovery of Human Remains

In the case of an unanticipated discovery of human remains and/or cultural items (such as funerary objects, sacred objects, or objects of cultural patrimony) that are subject to the Native American Graves Protection and Repatriation Act (NAGPRA) (25 U.S.C. § 3001-3013, 18 U.S.C.

§ 1170) and the Archeological Resources Protection Act (ARPA) (16 U.S.C. § 470aa Remains and Funerary/Sacred Objects), the CCD and CH2M propose to follow all relevant state and federal laws and recommendations regarding treatment of human remains as referenced in Section 1.1. The CCD recognizes the importance of providing careful and respectful treatment for human remains recovered as an unanticipated discovery or as part of an archaeological investigation. In the event of an unanticipated discovery of human remains, CCD will consult with the FTA and SHPO as to the appropriate federally recognized tribes or other groups with which to consult. In coordination with the FTA, SHPO, and other interested parties, a decision will be made for the treatment of the remains (for example, reburial, preservation in place, scientific study, sacred ritual, or a combination thereof). Pursuant to CRS 24-80-1302, this protocol includes the following:

1. If human remains are encountered, work in the general area of the discovery will stop immediately and the location will be immediately secured and protected from damage and disturbance. During construction activity, the area is to be marked off with clear evident means, such as flagging or tape.
2. All human remains or associated artifacts will be left in place and not disturbed. No skeletal remains or materials associated with the remains will be collected or removed until appropriate consultation has taken place and a plan of action has been developed.
3. The county coroner and medical examiner, local law enforcement, the FTA, the SHPO, and appropriate Indian tribes will be notified immediately. The coroner will conduct an onsite examination within 48 hours of notification to determine whether skeletal remains are human and the degree of their forensic value. If the coroner is unable to make these determinations, local law enforcement, the FTA, or the coroner may request the forensic anthropologist of the Colorado Bureau of Investigation to assist.
4. If the remains are determined to be human but have no forensic value, the coroner will notify the Colorado State Archaeologist of the discovery, who will in turn recommend security measures for the discovery location.
5. The Colorado State Archaeologist will facilitate the remains to be examined by a QPA who meet(s) or exceed(s) the pertinent qualifications in the Secretary of the Interior's Professional Qualification Standards (48 CFR §§44738-44739). The QPA will determine if the remains are more than 100 years old, evaluate the integrity of their archaeological context, and complete necessary documentation within a timely manner.
6. If human remains are determined to be Native American, the remains will be left in place and protected from further disturbance until a plan for their avoidance or removal can be generated. The State Archaeologist will notify the Colorado Commission of Indian Affairs (Commission). The FTA will consult with the SHPO, Commission, and federally recognized tribal groups to develop a plan of action that is consistent with the NAGPRA guidance.
7. If human remains are determined to be non-Native American, the remains will be left in place and protected from further disturbance until a plan for their avoidance or removal can be generated in consultation with the National Park Service (NPS), the SHPO and other appropriate parties. Historic research and consultation with local authorities and historic experts will be conducted by a QPA to try to determine the possible identity and affiliation of the remains and determine if there are any lineal descendants who should be consulted

concerning the treatment of the remains. Notice of the discovery will be published in local media outlets for at least 3 days to assist in identification of lineal descendants.

SECTION 2

Federal, State, and Local Agency Information

Table 2-1 identifies the agency representatives to be contacted in case of unanticipated discoveries.

Table 2-1. Contact List

Name	Title/Agency	Phone	Address	Email
Federal Transit Administration				
Cindy Terwilliger	Regional Administrator/FTA	303-362-2400	Federal Transit Administration, Byron Rogers Federal Building, 1961 Stout Street, Suite 13-301 Denver, CO 80294	
Colorado State Historic Preservation Officer				
Steve Turner	State Historic Preservation Officer	303-866-3355	History Colorado 1200 Broadway, Denver, CO 80203	steve.turner@state.co.us
Holly Norton	State Archaeologist Deputy SHPO	303-866-2736	History Colorado 1200 Broadway, Denver, CO 80203	holly.norton@state.co.us
Denver County Coroner				
	Office of the Medical Examiner	303-866-2736	500 Quivas Street Denver, CO 80204	medcomments@denvergov.org
Local Law Enforcement				
	Denver Police Department	720-913-2000	Police Administration Building 1331 Cherokee Street Denver, CO 80204-4507	dpdpio@denvergov.org
Colorado Commission of Indian Affairs				
Ernest House	Executive Director/ Colorado Commission of Indian Affairs	303-866-5470	Office of the Lt. Governor 130 State Capitol, Denver CO 80203	ernest.house@state.co.us
City and County of Denver				
Jacobs				
Amy C. Favret	Senior Archaeologist/ Principal Investigator	513-595-5642	1880 Waycross Road Cincinnati, Ohio 45240	amy.favret@jacobs.com
Sara S. Orton	Cultural Resources Specialist	504-810-0017	3330 W. Esplanade Avenue Suite 612 New Orleans, LA 70002	sara.orton@jacobs.com
Contractor **(TBD)**				