



Superior Street – 7th Ave W to 4th Ave E

Preliminary Design & Public Involvement

Summary Document

City of Duluth, MN

Draft 12/07/2015



LHB | SRF Consulting Group

Acknowledgements



Figure 1.1 View of downtown Duluth from Canal Park.

Client

City of Duluth



Consultant Team

- LHB
- SRF Consulting Group, Inc.
- Barr Engineering
- CDM Smith
- Braun Intertec



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- | | | |
|---|--|---|
| <i>Art in the Alley</i> | <i>Duluth Parking Manager</i> | <i>Minnesota Power</i> |
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| <i>Duluth Building Owner's and Managers Association</i> | <i>Grandma's Marathon</i> | <i>Security Jewelers</i> |
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| <i>Duluth Economic Development Authority</i> | <i>Healthy Duluth Area Coalition</i> | <i>St. Luke's</i> |
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Executive Summary

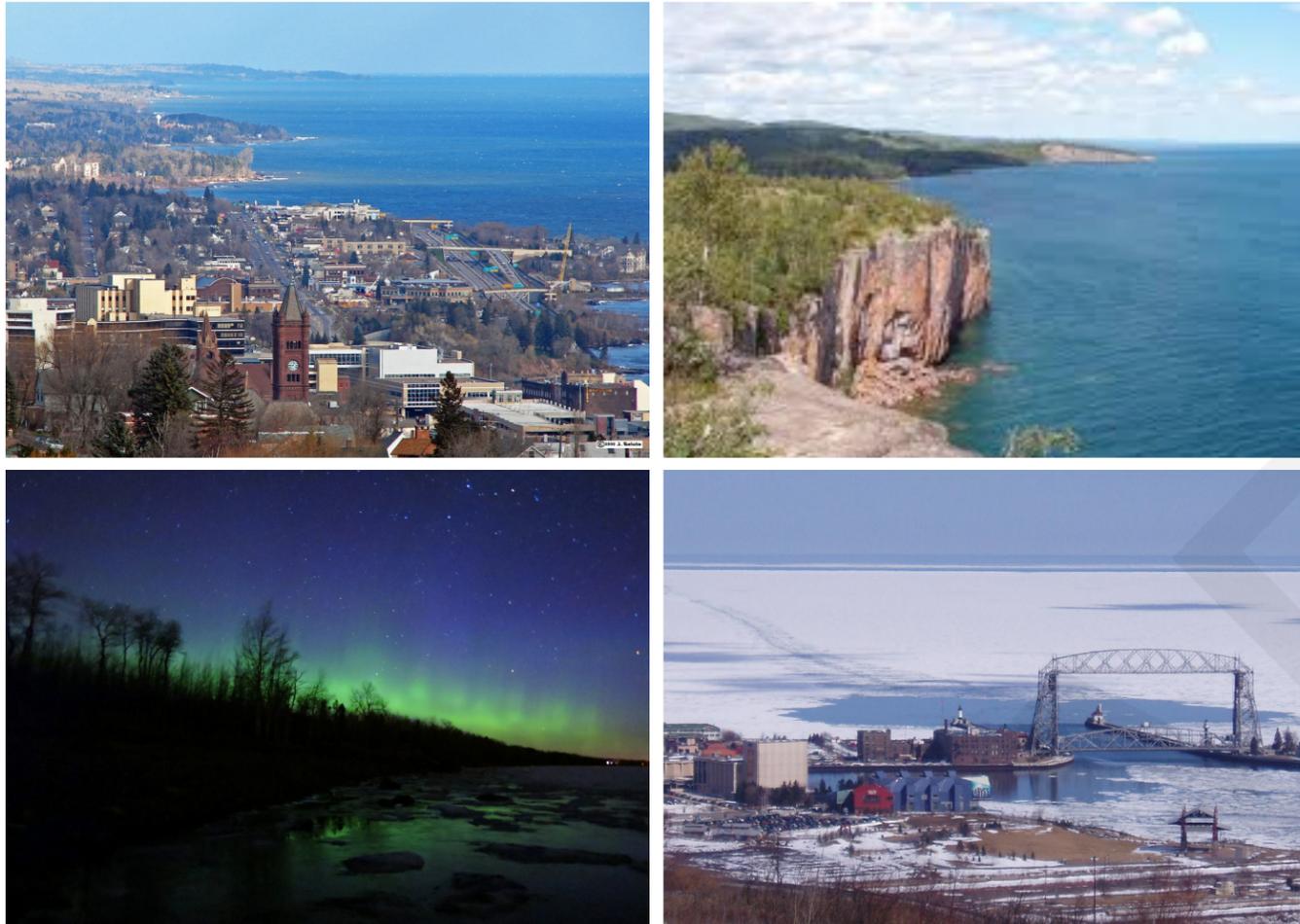


Figure 1.2 Images of Duluth and the surrounding area.

Superior Street

Superior Street is one of Duluth's oldest, most iconic streets. Overlooking the shore of Lake Superior, it is the vital corridor in the heart of Duluth's downtown commercial business district. It is a destination for commuters who work there, residents who call it home, and visitors from Duluth and beyond who come to enjoy the shopping, sports and entertainment venues, restaurants, lodging, outdoor recreation areas and tourism destinations that line the corridor. Superior Street is also a link and gateway between and to Duluth's surrounding neighborhoods and communities. Superior Street is Duluth's signature street and brings together a diverse mix of pedestrians, motorists, transit riders, and cyclists.

Superior Street is also significant in that it hosts several annual events and festivals, including Grandma's Marathon, the Christmas City of the North Parade, and Sidewalk Days, when it is closed to vehicles to accommodate festival tents and pedestrians. Farmer's markets and public demonstrations take place in the summer months at the plazas flanking Lake Avenue; there are also several connections to the Lakewalk along Superior Street's extent.

Challenges

Superior Street is a heavily used street with a relatively narrow right-of-way, and 30 years have passed since the last major surface renovation. It is in need of repairs, both above and below ground. The bricks that were installed in the mid 1980's present ongoing maintenance issues, and can create hazards for pedestrians, cyclists and vehicles. Diverse users compete for space within a constricted corridor space and, as a result, the street has been reconstructed in ad hoc ways over the years to accommodate the changing needs of transit, parking, and pedestrians, which has reduced its functionality and added visual confusion. Below ground utilities are in need of repair or replacement. The surface and below grade construction required to reconstruct the street will present a major disruption to a vital economic corridor, and will require innovative and flexible planning to help business and other downtown interests weather the change.

In addition to these functional aspects, the streetscape itself is in need of an overhaul. There is a lack of comprehensive wayfinding on the street, making orientation difficult for both pedestrians and vehicles. Landscaping has diminished over time as plants have struggled to survive in the harsh urban environment. There is also a need for increased flexibility in the streetscape to accommodate special civic events and everyday uses such as outdoor cafes.

Goals

This document outlines suggested improvements to the street, streetscape, traffic control, parking, transit, below-ground utilities, and operations with the goal of improving and enhancing the functionality, sustainability and user experience of Superior Street. The document also addresses the construction of the project, including phasing, traffic control, and access during work.

Process

Over the course of two years, the consultant team worked closely with the City of Duluth, the general public and various stakeholders to establish the recommendations contained in this document. Six public meetings were held to engage the public in the process. Numerous smaller meetings were attended with stakeholder groups and City staff.

Recommendations

This Preliminary Design Summary document presents the recommended street improvement concept which resulted from the public engagement and study process. It traces the history of Superior Street, gives an overview of the design and public engagement process, proposes improvements to the street configuration and streetscape, discusses utilities, covers construction and phasing, presents a preliminary cost estimate, and reviews project financing. The appendix includes documents integral to these subjects, including block by block street and streetscape layouts. The recommendation is to follow the preferred concept as it corresponds to the studied subjects.



» Running parallel to Lake Superior through the heart of downtown, Superior Street is home to theaters, hotels, entertainment venues, offices, cafes, restaurants and retail stores. It is a bus transit route, and is used by tourists, locals, and logging trucks alike.

Figure 1.3 The intersection of Superior Street and Lake Avenue, looking east.

Project Purpose and Intent

- » Purpose and Intent
- » Context and Study Area



Figure 1.4 Existing streetscape images.

» *The study area runs along the 80' right-of-way of Superior Street, stretching from a block west of Sixth Avenue West to Fourth Avenue East.*

Purpose and Intent

The purpose of this document is to provide a record of the preliminary design and public involvement phase for Superior Street and to act as a guide for the final design.

The preferred street and streetscape layouts address space allocation related to vehicle traffic, transit, parking, pedestrians and bicyclists. It also addresses streetscaping in terms of image and appeal, pedestrian movement, related amenities, decorative lighting, landscaping and public and private utilities beneath the street.

Context and Study Area

Superior Street runs northeast/northwest along the southern edge of downtown Duluth and the north shore of Lake Superior. It is a major arterial within the city, carrying passenger vehicles, semi-trucks, buses, pedestrians and bicyclists. The perpendicular avenues run uphill towards downtown and residential neighborhoods; Lake Avenue is a major cross street as it connects Superior Street to Canal Park and Interstate 35. The Lakewalk, a pedestrian boardwalk that connects people from downtown to the lake front, has access points along Superior Street at 1st Avenue East, mid-block just east of 2nd Ave East, and in the plaza east of Lake Avenue.

The study area runs along the 80' right-of-way of Superior Street, stretching from the mid-block west of Sixth Avenue West to Fourth Avenue East.



Figure 1.5 Superior Street study area.

Project Study Area

Historic Context



Superior Street 1888



Superior Street 1895



Superior Street 1905



Superior Street 1909

Figure 1.6 Historic images of Superior Street.

» *“Superior Street was a mere trail cut through the woods, so rough that sledges and wagons, which constituted traffic, had to wind their way carefully around tree stumps and boulders... Wolves, bears, and deer living in the surrounding woods used to come to the edge of town to peer curiously at the usurping humans, and at night the cries of wild animals could be heard...” E.A. Silberstein(Duluth, 1870)*

Historic Context

Superior Street is one of Duluth's oldest streets. Once a trail cut through the wilderness, it is now a commercial and retail hub that is the focal point of the downtown area. As the main route through Duluth, the street has undergone a series of transportation and streetscape-related changes:

- «In 1854, the Treaty of LaPointe opened the north shore for non-American Indian development
- «Between 1882 and 1883, a rail line on Superior Street was constructed between 8th Ave West and 3rd Avenue East.

- «In 1883, a mule-drawn car on rails was the city's first public transit system. By the end of the 1880's, there were 15 cars and 178 mules on 4.5 miles of track. In 1890 the mules were replaced by an electric streetcar.
- «The first water main was installed in 1887, followed several years later by the doubling of Duluth's population from 30,000 to 60,000 residents
- «The first gas-powered bus appeared in Duluth in 1924, and in 1931 the first electric trolley was put in service. During the 1930's all streetcars were replaced by buses.

- «The Gateway Urban Renewal Project took place during the 1950's and 60's, and in an attempt to eliminate perceived blighted areas, many buildings were razed along Superior Street's western end, including several once-significant architectural and cultural landmarks
- «The first segment of Duluth's downtown skywalk system was built in 1977, crossing Superior Street and connecting First National Bank to the Normandy (now the Holiday Center).
- «Grandma's Marathon began in 1977, running down Superior Street on its way to the finish on Canal Park Drive.

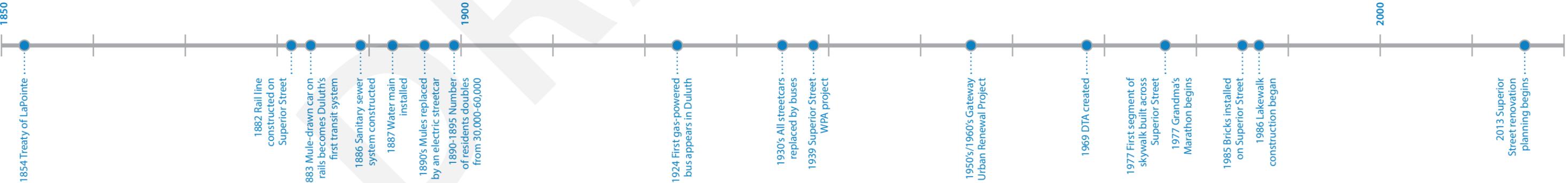


Figure 1.7 Historic timeline of Superior Street



Superior Street 1922



Superior Street 1950's



Superior Street 1985



Superior Street 1985

«Bricks were installed on Superior Street in 1985 as part of a \$7.5 million renovation project. Maintenance proved difficult, as the bricks began to come loose before construction even ended.

«Lakewalk construction began in 1986, and wrapped up in 1991 with an extension to 26th Avenue East. Connections to the Lakewalk from Superior Street currently occur along Superior Street at 1st Avenue East, mid-block just east of 2nd Ave East, and in the plaza east of Lake Avenue.

» *Poor old downtown Superior Street. Almost everybody knows it's overused . . . an 80-ft wide strip of street and sidewalks that is being used at 20 percent above its carrying capacity . . . used daily by 17,000 vehicles and 13,000 pedestrians. (DNT, 1975)*



Figure 1.8 Historic images and newspaper clippings of Superior Street.

Project Goals and Objectives



Figure 1.9 Streetscape improvements, incorporating festival spaces, ADA compliance, and accommodating transit are among some of the project's goals.

Project Goals and Objectives

At the outset of the planning process for Superior Street, project objectives were arrived upon to guide the development of design concepts and to employ the objectives as evaluation criteria to assist in determining a preferred scheme. Planning objectives include the following:

- Accommodate current and forecasted traffic
- Accommodate vehicles, transit, pedestrian and bicycle movement
- Meet Municipal State-Aid (MSA) design requirements
- Replace or repair affected public utilities and coordinate with private utility improvements
- Comply with ADA guidelines, promote public and user safety and improve pedestrian mobility
- Consider future operation and seasonal needs, reduce surface maintenance
- Improve pedestrian connections
- Contribute to meeting parking requirements
- Accommodate transit facilities and related operations
- Reinforce Superior Street as a 'signature street'
- Provide energy efficient lighting for safety and aesthetics, comply with dark sky guidelines
- Provide programmable space for festival activities and civic events
- Incorporate wayfinding systems
- Contribute to Duluth's economic climate and business vitality
- Conform to the project's cost parameters and available funding
- Implement construction project staging and phasing to minimize adverse business impacts.

Project Schedule

- » General
- » Topographic and Utility Survey Phase
- » Preliminary Design and Public involvement Phase
- » Final Design Phase
- » Construction Phase

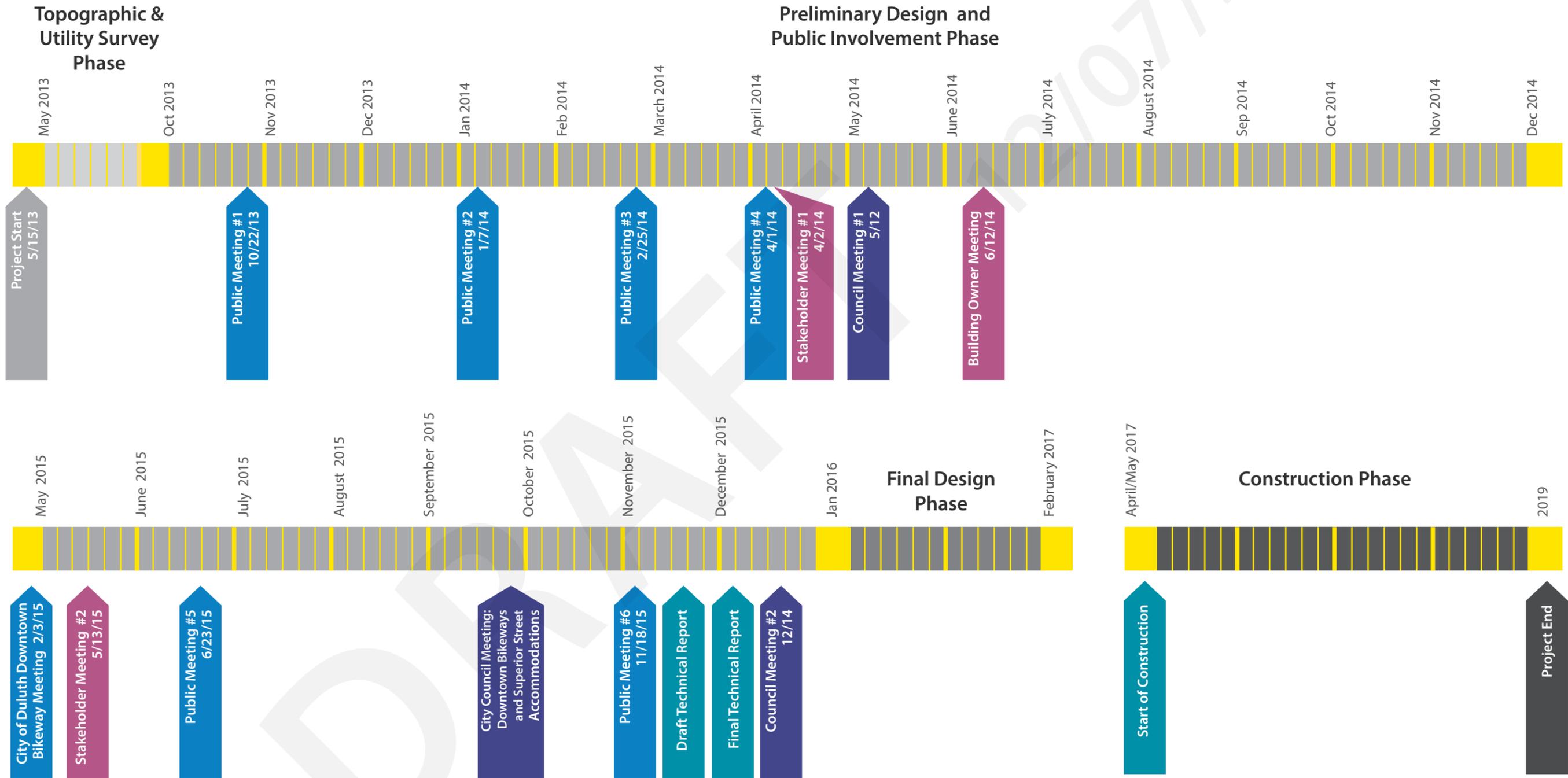


Figure 1.10 Public process, design and construction schedule.

Public Involvement

- » Public Involvement and Process
- » Concept Alternatives
- » Public Process Direction



Figure 1.11 Six public meetings were held to collect feedback from stakeholders throughout the design process.

Public Involvement and Process

Broad based public involvement was a cornerstone of the Superior Street preliminary design process. Being that Superior Street is the signature street of Duluth, there were diverse interests and perspectives represented. An engaging process was conducted to allow all parties to participate and contribute their respective values and priorities.

The backbone of the public involvement process was six community meetings, arranged to begin as an open conversation about the street's future and evolving toward a preferred scheme that balances the many varied needs of the corridor. A concise overview of each meeting follows.

Meeting Number 1 — "State of the Street," October 22, 2013, Greysolon Building.

Around 120 people attended the initial meeting, which provided participants with a historical perspective of Superior Street, its value to the community, development over time and current status. Project need and intent were examined including existing issues and challenges presented by the street, sidewalk and utility condition. Operations and maintenance concerns were summarized. Opportunities for positive change and improvements were highlighted, with an emphasis on public input to direct the preferred concept. A general construction schedule, funding alternatives and

implications for adjacent properties were discussed. The meeting provided attendees the opportunity to pose questions, and they were given fact sheets, a survey/feedback form, project contact cards and access to the project web site to encourage ongoing involvement. Public comments received at the initial meeting focused on potential property/business assessments, construction timing and phasing, current street and sidewalk conditions, the need for more parking and bicycle accommodation.

Meeting Number 2 — "Design Workshop," January 7, 2014, Radisson Hotel.

The meeting, attended by approximately 120 citizens, began with a general presentation of the project intent. The consultant team shared an analysis of physical constraints and project parameters along with opportunities that could be seized upon by Superior Street reconstruction. The team also presented high level ideas regarding street layout and configuration, surface materials, streetscape elements, amenities and gathering spaces. Input from the first public meeting, volunteered through the survey/feedback forms, was also shared. Attendees were then divided into teams to arrive upon and discuss "big picture" concepts to be considered by the process. Discussion was energetic, representing the many diverse values and priorities found within the various interests. Team reports were documented with work sheets that summarized each team's conclusions. Analysis mapping was available for attendees

to examine in further detail and critique with "post it" notes and a dot exercise to determine likes/dislikes among streetscape elements and precedent project images. Survey/feedback forms provided another opportunity for input. The majority of the meeting attendees participated in written feedback; either through Post-it notes on meeting graphics or through survey forms. The attendees endorsed the notion of Superior Street as Duluth's signature street. Strong interest was shown for additional parking, a safe pedestrian environment, bicycle accommodation, gathering spaces, public art and festival spaces.

Meeting Number 3 — "Concept Review," February 25, 2014, Holiday Inn.

Approximately 100 citizens attended the meeting. Idea generation from the Design Workshop (meeting number two) had established direction for four concept alternatives (see Figure 1.15 through Figure 1.18 and detailed discussion on page 16), which were then formalized by the consultant team and presented at this meeting. Meeting attendees were divided into tables, each with a facilitator. Discussion was directed to the review and evaluation of each Superior Street concept, themes for further consideration, and general reactions. Table discussions provided a format to identify where elements and functions complimented each other versus were in conflict. Attendees showed clear support for qualities of a signature street including one that is pedestrian/bicycle friendly,

provides wayfinding and information signage, is a destination, provides flexible space for programming, maintains traffic needs but at a moderate speed and includes pedestrian amenities.

Meeting Number 4 — "Refined Streetscape Concepts," April 1, 2014, Greysolon Plaza.

Meeting number four was an open house attended by approximately 110 citizens, revealing two refined concepts for public review: the Spine and the District. Detailed block by block illustrations of each concept provided definition of space, materials, function and inherent trade-offs. Photographic and sketch images were used to convey design themes, material alternatives, streetscape character and circulation patterns. Consultant and city staff were available to further describe the alternatives and foster more discussion among attendees. Trade-offs between on street parking and full bicycle accommodation became a focus of discussion for attendees. Comments were solicited via questionnaires and Post-it notes on drawings. Approximately 70 questionnaires were received. Written feedback addressed a strong endorsement for additional on street parking, heightened interest for bicycle accommodation and increased sidewalk width for amenities and civic events. Meeting input primarily supported the District Concept.



Figure 1.12 Post-it comments from various Superior Street public meetings.

Meeting Number 5 — “Preferred Concept,77” June 23, 2015, Radisson Hotel.

An estimated 130-140 citizens and business representatives attended this meeting, which took the form of a formal presentation and general question and answer period, followed by an open house. Many of the attendees were from downtown business interests and those representing the bicycle community. The meeting’s purpose was to present the preferred street layout and the preferred streetscape plan. Block by block illustrations conveyed the preferred design intent including curb line, parking, sidewalk spaces, streetscape treatment, landscaping, and flexible space for amenities and festivals. In addition, an overview highlighted the process to date, progress and decisions made in the past year, and next steps yet to be completed. Attendees were encouraged to fill out a survey form and post comments on the presentation graphics regarding their thoughts, identification of errors or inconsistencies, and constructive comments for change. During the general question and answer period, the majority of the questions were directed to bicycle accommodation in the downtown area and scheduling implications for business hours during the construction process.

Over 90 written comments on surveys were submitted. These addressed:

- Minor revisions to the parking layout to accommodate additional spaces

- The inclusion of public art, its potential locations and themes to be considered
- Bicycle accommodation on Superior Street and/or within the downtown
- The provision and coordination of wayfinding elements
- Use and design of the bump outs at block ends
- Subjective comments regarding streetscape element aesthetics

A questionnaire encouraged additional feedback from attendees.

Meeting Number 6 — “Construction Schedule/Preliminary Layout” November 18, 2015, Greysolon

The sixth and final planned public meeting for the Superior Street Reconstruction preliminary design process at the Greysolon Ballroom was attended by approximately 65 people. The meeting’s purpose was to present the preferred street and streetscape layout plans focusing on changes made subsequent to the fifth meeting held in June, 2015. In addition, new information was presented pertaining to project phasing and sequencing, the current construction schedule, construction activities, funding sources and necessary coordination with building owners and tenants. Particular attention was given to public and private utilities, and service connections to buildings including during construction activities.

The meeting format was an open house with a formal presentation. General questions and discussion followed the presentation. The open house format provided an opportunity for one to one discussions pertaining to building specific questions or topics of individual concern. Presentation boards for the open house displayed graphics illustrating the preferred preliminary roadway and streetscape layouts, supporting elements, project phasing and staging, images and perspectives, and construction activities. Attendees were encouraged to fill out a survey form and post comments on the presentation graphics regarding their thoughts, identification of errors or inconsistencies, and constructive comments for changes. The majority of the written comments focused upon the need for communication and coordination during construction.

During the general question and answer period, the majority of the questions were directed to construction activities, utility coordination with building service, building access, communication during construction and post construction street/streetscape maintenance and operations. Discussion also addressed the status of bicycle accommodation planned for the downtown, near and long term.

Other Meetings or Information Sources

In addition to the public meetings, numerous other meetings and forums provided stakeholders with project information and

the ability to participate in the planning process. Two stakeholder committee meetings were held to share concept alternatives and evaluate their performance. A business owner/property meeting was held in the spring of 2014 to provide an overview of utility reconstruction, its implications for individual buildings and potential sequencing for utility construction.

In addition to meetings, a project web site provided ongoing updates regarding the project, incremental decision-making, and near term meetings or events. The project email list included 219 people. All project updates and meeting notices were sent to the email list, the GDC membership and BOMA mailing list. Press releases were sent out prior to all public meetings. Additional media coverage included 24 articles occurred in local media/blogs including newspapers, radio and television. Regular updates were provided by staff at the GDC meetings.

City Council Presentations and Actions

Integral to the preliminary design process were meetings with the Duluth City Council. City Councilors had representation at each of the six public meetings along with staff briefings during the process.

An initial Council presentation was made May 12, 2014 to provide a comprehensive review of the project, its goals, alternatives considered, public involvement and issues to be addressed. This presentation provided the Councilors with visuals and supportive

information. Councilors posed questions to city staff and the consultant team related to parking, bicycle accommodation, traffic and material durability.

On September 28, 2015, the City Council heard public comment and voted on separate resolutions regarding downtown bike accommodation. The council meeting was the culmination of a City led process (Downtown Bikeways Study) that the City had initiated in fall 2014 to evaluate the potential and feasibility for a designated downtown bikeway. The City had presented an evaluation of downtown bikeway options at a City meeting on February 3, 2015 which included bikeway accommodation on First Street, Superior Street or Michigan Street, among others. A subsequent detailed study was performed to further study a cycle track option on Michigan Street and which determined that a cycle track on Michigan Street was potentially feasible subject to further study of linkages to existing bike corridors on the east Avenues and review/input from adjacent building owners and tenants. At the September 28 meeting, having reviewed the outcomes of the Downtown Bikeway Study and the Michigan Street Bike Accommodation Study, the City Council was asked to vote on three resolutions regarding a downtown bike facility:

1. Resolution 15-0668 R calling for a downtown bike facility on Superior Street;
2. Resolution 15-0667 R calling for a downtown bike facility on Michigan Street from Sixth Avenue West to First Avenue East, and on Superior Street from First Avenue East to Fourth Avenue East; and,
3. Resolution 15-0666 R calling for a downtown bike facility on Michigan Street (as amended).

After public comment, the Council denied Resolutions 15-0668 and 15-0667. The Council approved Resolution 15-0666R as amended.

The third City Council meeting is scheduled for December 14, 2015 at which time the preferred preliminary design recommendations will be presented.

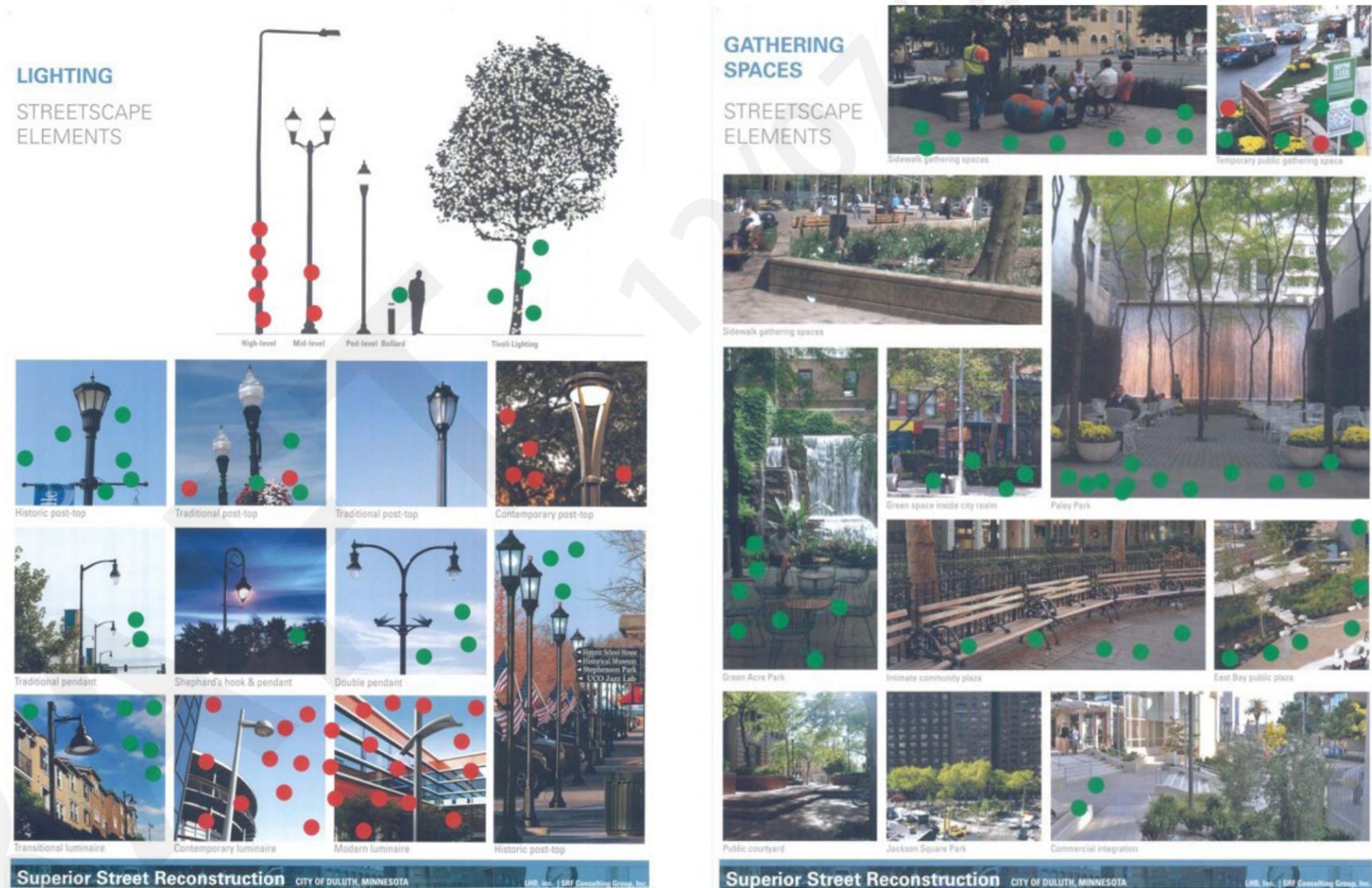


Figure 1.13 Sample dot exercise boards with preferential voting from meeting number two.

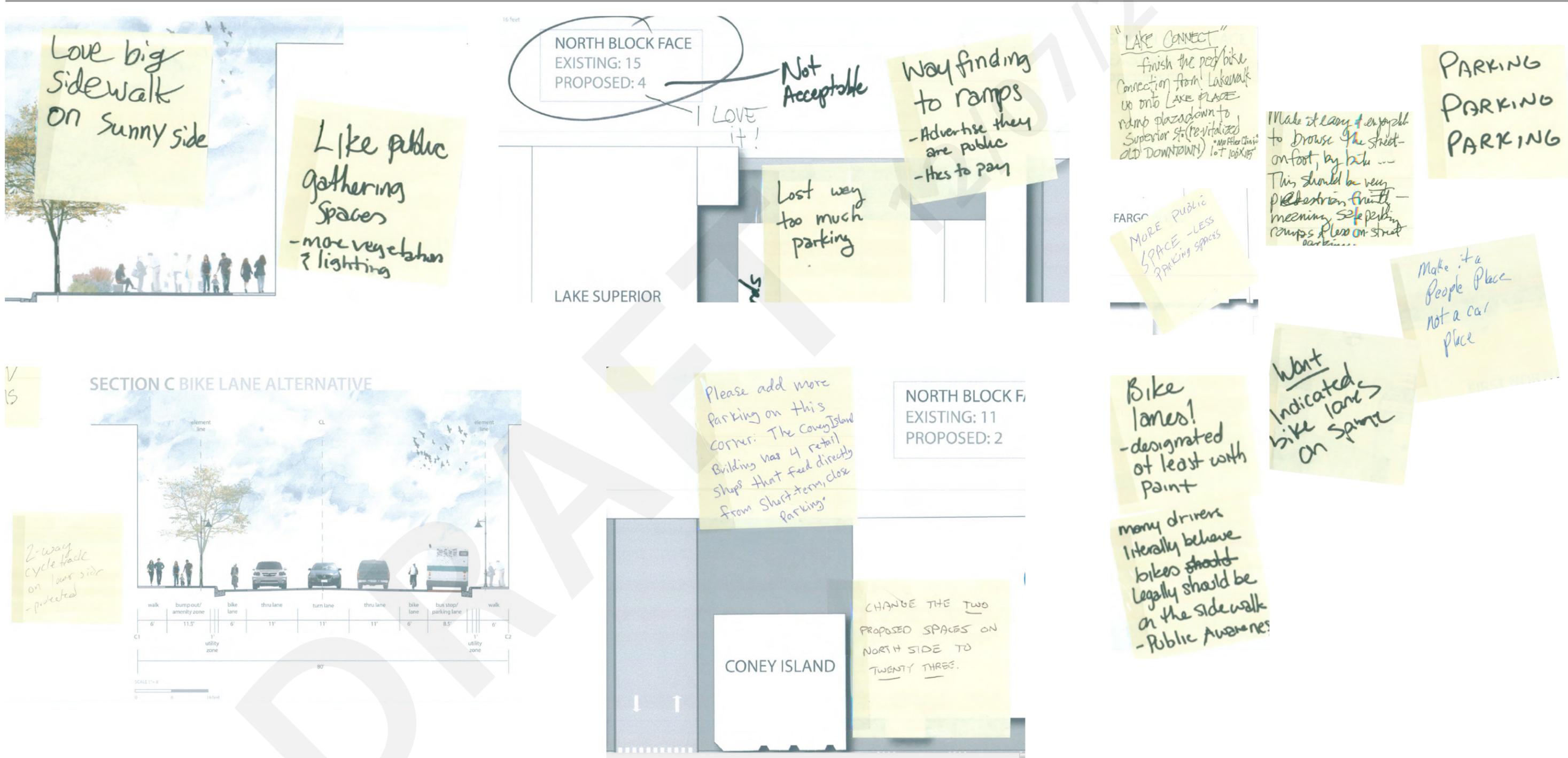


Figure 1.14 Post-it comments from various Superior Street public meetings.

Concept Alternatives

Based upon public input received at the Design Workshop (public meeting number two), four concept alternatives were arrived upon to generate feedback and solicit participant values and priorities. These included:

- **Baseline (Figure 1.15)**—The Baseline streetscape option proposes to re-build Superior Street while preserving its existing character and overall street layout. Existing parking patterns and traffic movements are improved where it is practicable to do so but major corridor revisions are not emphasized. The level of streetscape amenities is consistent with the existing street but updated to emphasize current community priorities and uses.
- **Festival (Figure 1.16)**—The Festival streetscape concept proposes to reinforce and make central Superior Street's role as a public gathering space and location for special events and outdoor festivals. The streetscape is pedestrian focused: on-street parking is eliminated or greatly reduced in favor of creating flexible, multi-use, signature spaces on each block. Amenity focus is placed on programmable spaces that enhance the use of the street throughout the year.
- **Spine (Figure 1.17)**—The Spine streetscape concept proposes to acknowledge and amplify Superior Street's role as a gateway to the community that also provides strong connections to neighboring destinations, facilities and attractions. Amenity focus is at the intersections, gateways, and other key connection points. Traffic flow is streamlined with an emphasis on facilitating movement for vehicles, pedestrians, and bicyclists with efficient use of corridor space.
- **District (Figure 1.18)**—The District streetscape concept focuses on Superior Street as a central destination in the community with a unique identity. Mid-block plaza areas and flexible gathering spaces are emphasized. On-street parking is maximized and some "convertible" parking areas are created. Amenity focus is pulled away from the intersections and toward the overall street level with a desire to create a space that invites a variety of users and where passersby will linger. **After public meeting #4, the District concept was selected as the preferred direction for Superior Street.**

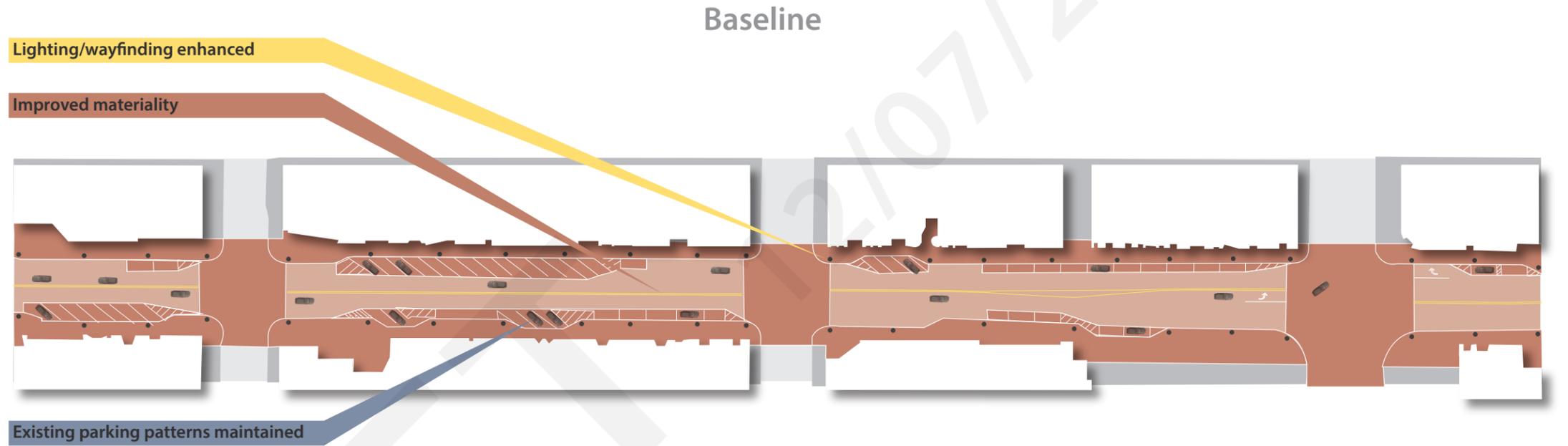


Figure 1.15 Baseline concept.

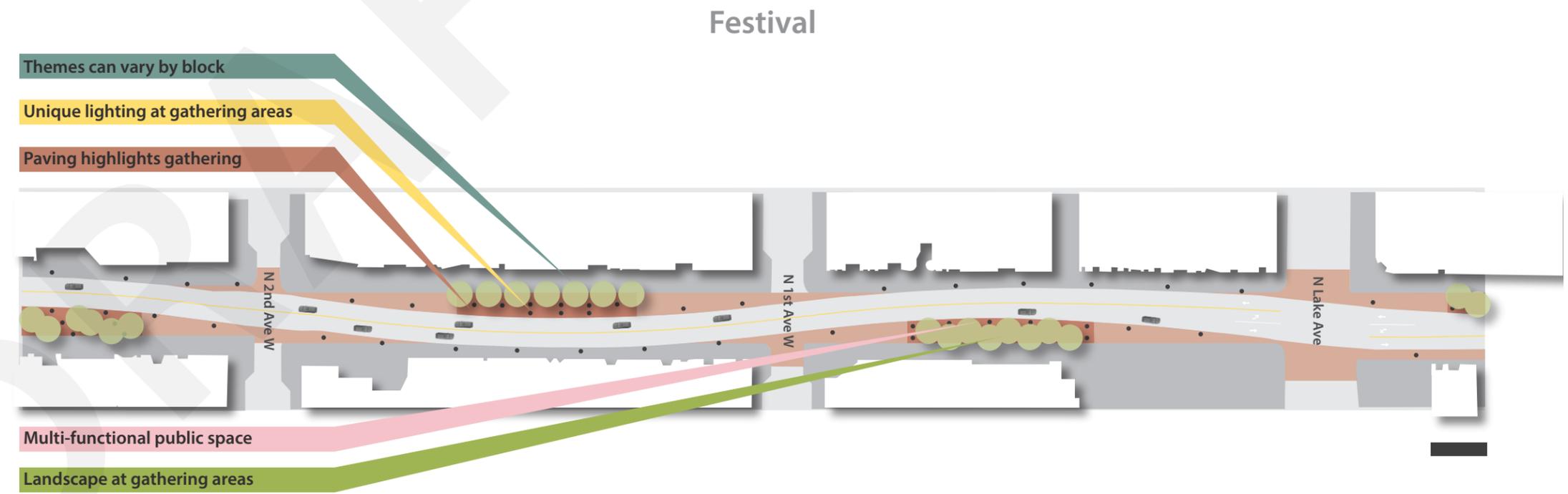


Figure 1.16 Festival concept.

Spine

District

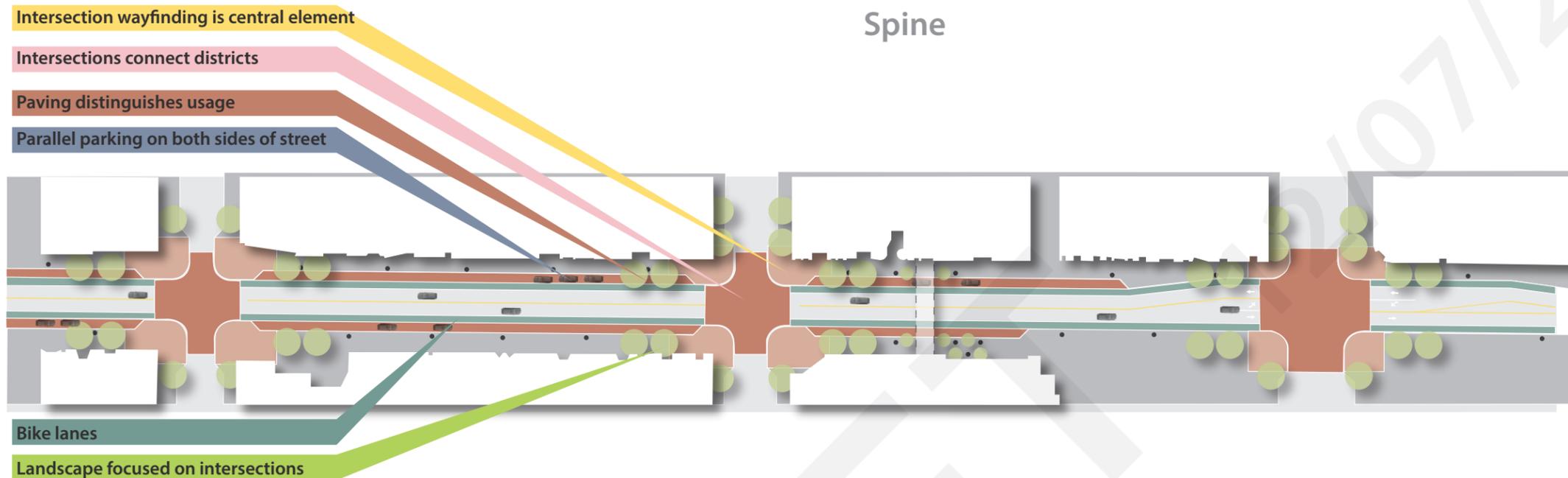


Figure 1.17 Spine concept.

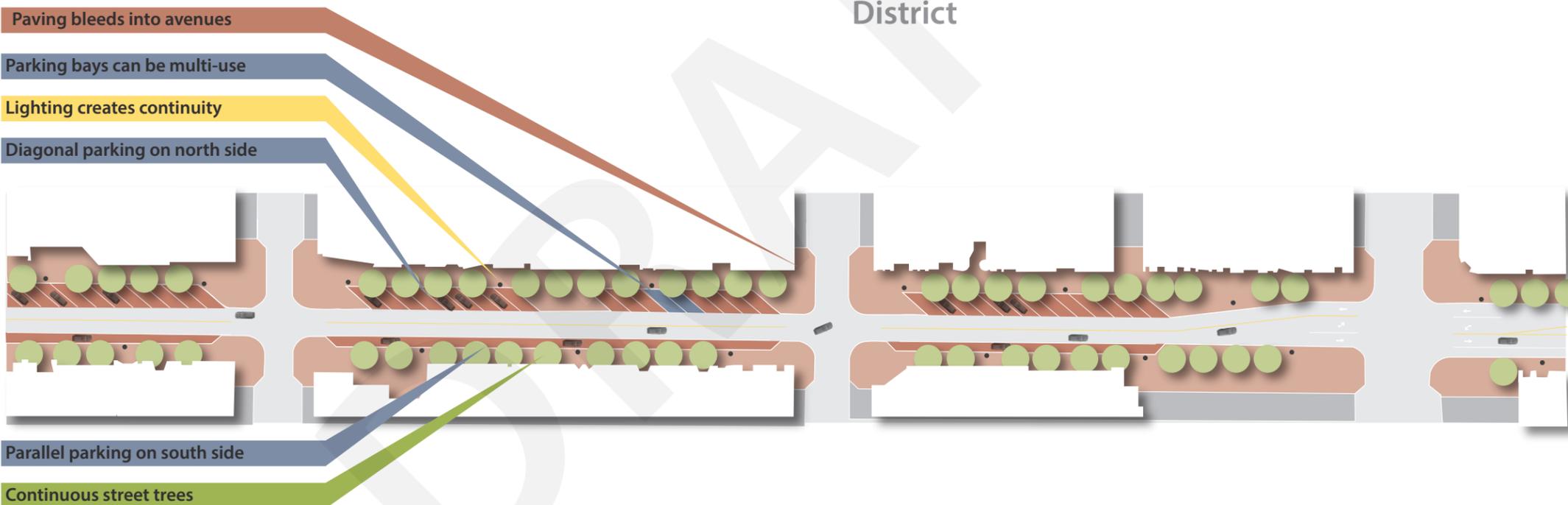


Figure 1.18 District concept.

Public Process Direction

Overall the public process engaged a wide variety of participants in a robust discussion of the function and values surrounding Superior Street, both currently and in the future. At the outset of the process, individuals and groups expressed diverse priorities; as the process progressed, a strong sense of direction became clear which then established a foundation for a preferred street and streetscape design. Common elements and themes arrived upon include:

- The corridor should remain Duluth’s signature street with a distinct identity and a strong visual appeal consistent with the city’s downtown, commercial core.
- Vehicle needs, current and forecasted, need to be met while balancing transit and pedestrian accommodations.
- Superior Street and its adjacent land uses are bicycle destinations; bicycle accommodation is needed into and throughout downtown. Bicycle connections to Superior Street and bicycle parking are needed to support this movement.
- The pedestrian environment must be safe, convenient and attractive.
- On street parking must be preserved for business vitality.
- Space and facilities are needed to support civic events, festivals, seasonal celebrations and business promotions.
- Construction materials should emphasize durability and sustainability whenever possible.
- Operations and maintenance procedures need to be designed into the street and streetscape layout.
- Construction phasing, staging and traffic control should be mindful of business access and daily operations.

» After public meeting #4, the District concept was selected as the preferred direction for Superior Street.

Street Layout and Configuration

- » Introduction
- » Discussion of Layout: West Blocks
- » Discussion of Layout: East Blocks

Introduction

Following the robust public process, including informal voting and discussion on the part of the public and city staff, group consensus was arrived upon for a street layout and configuration that most closely resembled the District Concept. This concept was further developed into a block-by-block layout, which is described here and illustrated with representative block layouts. The full street layout can be found in the Appendix.

Discussion of Layout: West Blocks

In general for blocks west of Lake Avenue, the street layout brings together a combination of diagonal parking on the north side of the street and parallel parking on the south side of the street.

Loading zones in general mirror their existing use and location on the street and are expected to vary over time depending on the business or interest that occupies the adjoining building. A minimum of one ADA accessible parking spot is provided on each block. Transit stops are positioned at the end of each block to facilitate bus traffic. The length of the transit stops are determined by the DTA and individual stop locations have been vetted with the DTA, based on current and future predicted routes and destinations. DTA buses and stops, in general, are 40-ft long although some stops are longer to provide concurrent use by two buses. Individual transit stops may be adjusted in the final design based on the final configuration and placement of the pedestrian cross walks.

A primary focus for the street layout in the proposed design is the use of pedestrian bump outs at the intersections. The bump-outs provide a more pedestrian centered experience by increasing amenity space, reducing pedestrian crossing distances, and providing traffic calming. Pedestrian bump outs will necessarily require some compromise with respect to vehicle turning movements in comparison to the existing condition. As shown, vehicle turning movements at intersecting Avenues favor passenger vehicles in lieu of larger truck traffic where bump outs are provided. Some adjustment may be required in final design if a larger required vehicle turning movement is identified at any given avenue: however, in general, larger turning movements are more readily attained at Lake Avenue and 5th Avenue West which are among the higher ADT routes that access Superior Street.

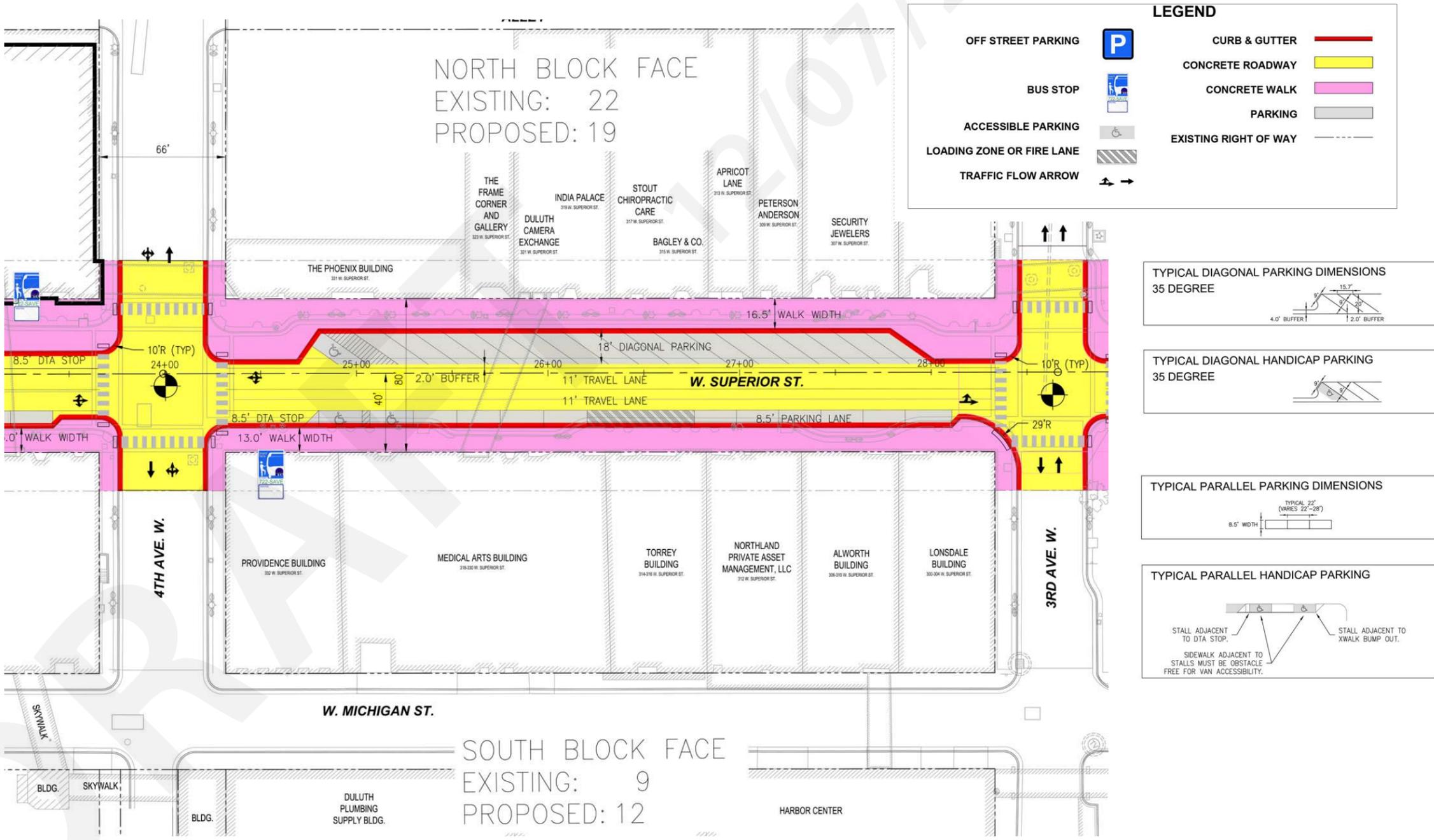
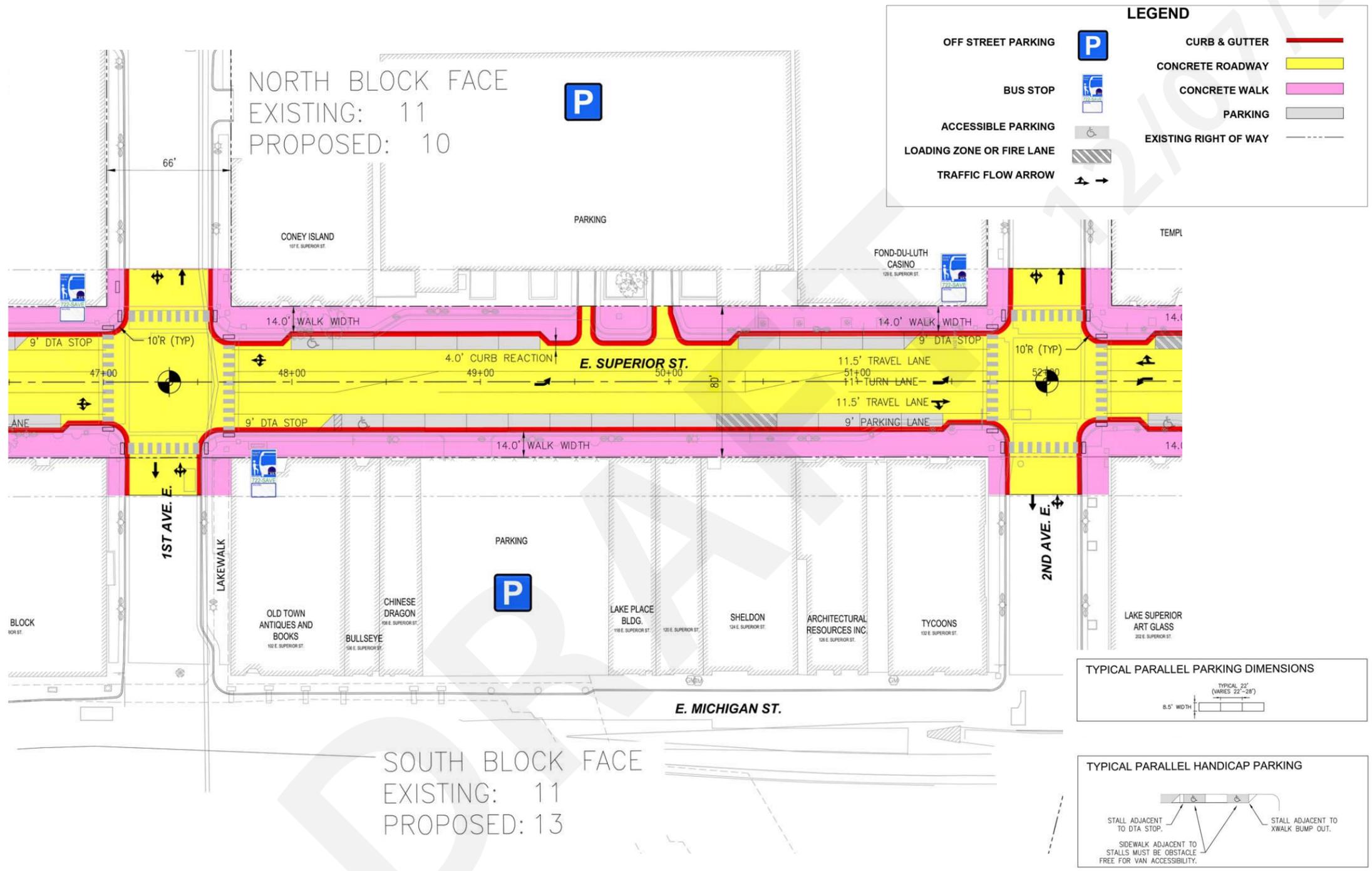


Figure 1.19 Proposed street layout of representative block, between 4th Avenue West and 3rd Avenue West.



The use of diagonal parking in the configuration shown is informed by its past and successful use on Superior Street. Diagonal parking on Superior Street cannot provide the relatively large amount of dedicated space between the stall and through driving lane required by State Aid Rules. The configuration shown mirrors the present use, and represents a compromise between the parking desires of adjoining businesses and the limited corridor width. The diagonal parking arrangement shown will require a variance from State Aid standards. To accommodate diagonal parking, the center line of the through traffic lanes is necessarily offset to the south of the corridor center line.

Discussion of Layout: East Blocks

East of Lake Avenue, the street layout uses parallel parking on both the north and south sides. The use of a center left turn lane is shown to promote through traffic movement and to avoid potential queuing for traffic entering the Fon-Du-Luth Casino. The turn lane shown also anticipates the dedicated left turn lane that runs the entire length of the street between Lake Avenue and 1st Avenue East which is recommended by the project traffic study.

In general, due to the use of parallel parking, the roadway configuration is essentially symmetrical and the roadway center line should coincide with the corridor center line.

The general discussion points regarding ADA layout, loading zones and pedestrian bump outs as described previously for the west block also apply to the east blocks of the project.

Figure 1.20 Proposed street layout of representative block, between 1st Avenue East and 2nd Avenue East, and inset showing parking dimensions.

Streetscape Layout

- » Representative Streetscape Layouts
- » Typical Intersections
- » Temporary Spaces/Festival Areas
- » Surface Materials
- » Public Art Themes
- » Lighting and Electrical
- » Landscaping Concept
- » Special Provisions, Planters, Planting Medium
- » Recommended Plant Materials
- » Furniture/Streetscape Elements
- » Gateways and Connections
- » Wayfinding and Signage
- » Streetscape Perspectives
- » Streetscape Sections

Introduction

As the street layout was being developed, the streetscape design evolved concurrently to capture comments received during the public involvement process and from City staff. Beyond the strictly functional aspects of the street layout, the streetscape design addresses place-making elements of Superior Street: comfort and perception of users, gathering and festivals, surface materials, public art, lighting, landscaping, furnishings and wayfinding. All of these elements add up to create a sense of place that uniquely reflects the culture and character of downtown Duluth and the surrounding area. The following pages describe each of these streetscape elements in greater depth.

Representative Streetscape Layouts

The streetscape layout proposed for Superior Street has been designed to provide a safe, convenient and attractive pedestrian environment while being mindful of the necessary operations and maintenance requirements. Typical streetscape layout, Figure 1.21 and Figure 1.22, illustrate representative blocks located west and east of Lake Avenue. These blocks vary due to the differing parking layouts and street configurations found east and west of Lake Avenue.

West of Lake Avenue

West of Lake Avenue, as shown in the typical block between 3rd and 4th Avenue West, parking is both parallel and diagonal. Parallel parking occurs on the south side with typical sidewalk width of 13 feet. Where possible, bump outs exist at block ends. Diagonal parking occurs on the majority of the north side blocks. Typical sidewalk width is 16.5 feet with bump outs providing larger block end spaces. The more generous block end space results from defining the diagonal parking areas. These block ends also provide more ample space for amenities, public art, seating, and programmed activities. A pedestrian circulation space (clear sidewalk width without signs, light poles, fixtures, etc.) of at least 7.5 feet in width occurs for both the north and the south sides. Vertical elements and streetscape amenities are located in a band of space between the pedestrian way and curb.

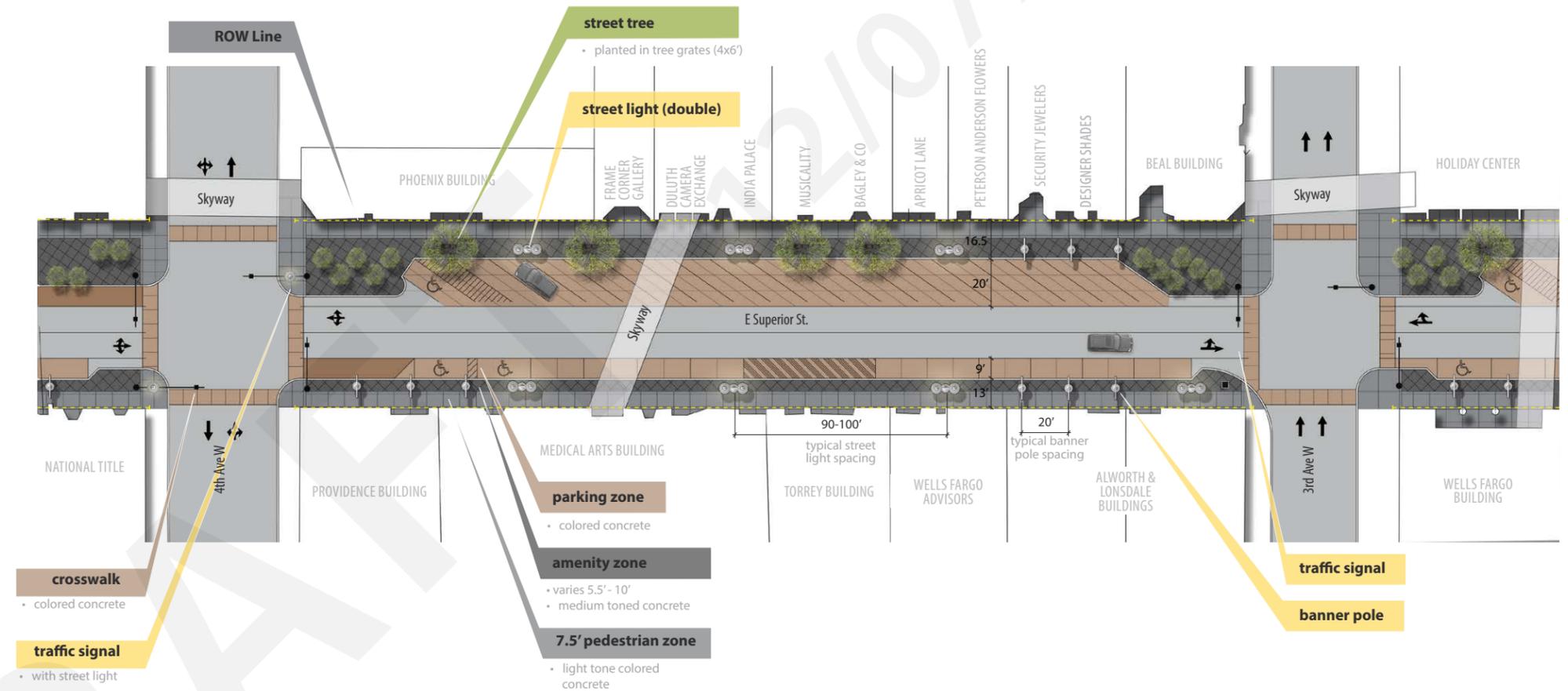
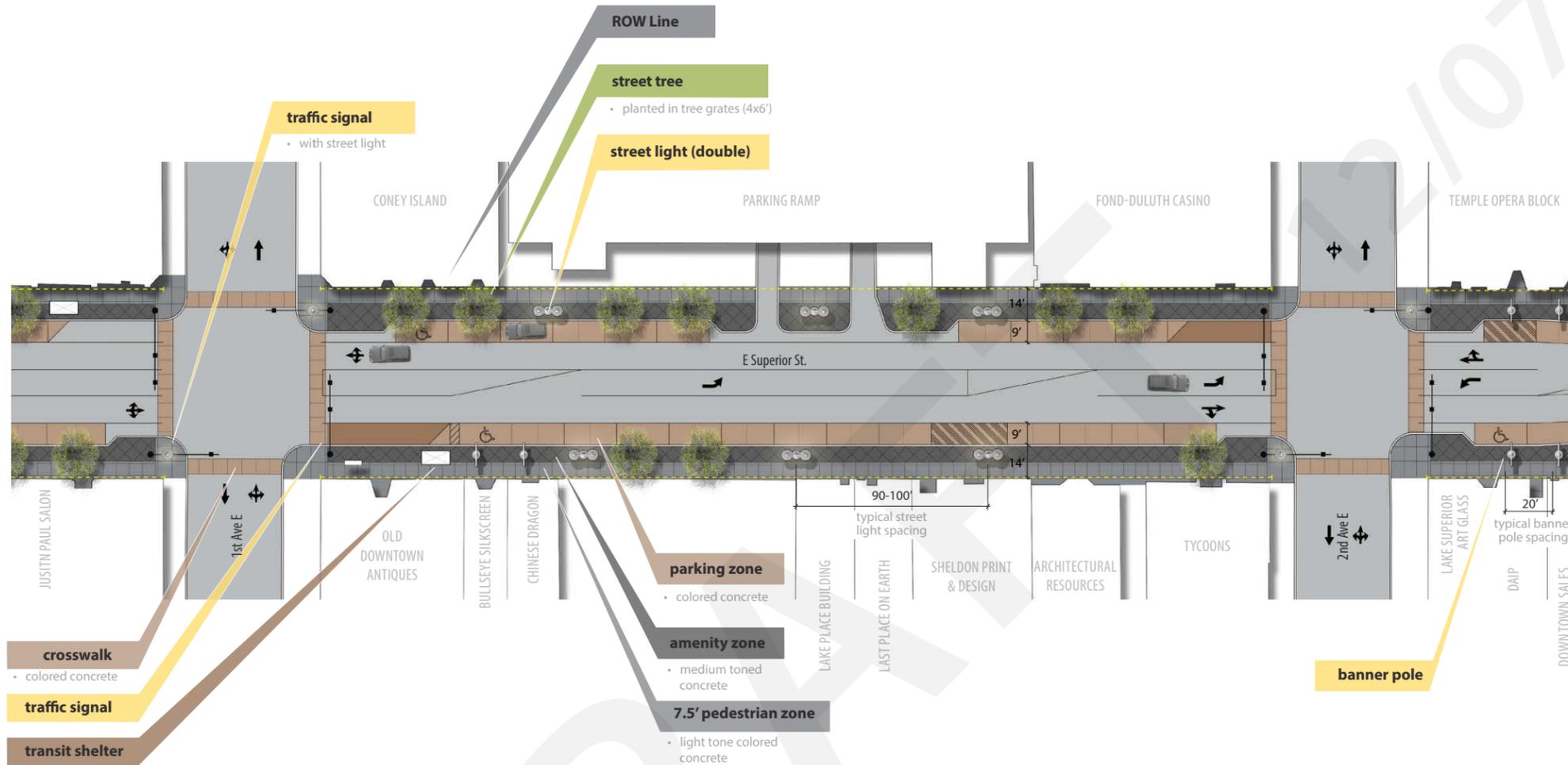


Figure 1.21 Representative layout west of Lake Avenue.



East of Lake Avenue

East of Lake Avenue, as shown in the typical block between 1st and 2nd Avenue East, parallel parking occurs on both sides of the street in turn providing a linear approach to space within the sidewalk area. Typical sidewalk width is 14 feet. A pedestrian movement corridor, 7.5 feet or greater, provides circulation without limitations. This width also accommodates snow removal equipment. Vertical elements and streetscape amenities are located in a band of space between the pedestrian way and curb. Additional amenity space exists at block ends where bump outs (curb extensions) widen the sidewalk area. This provides a shortened street crossing distance, space for lighting, street furniture, landscaping and public art. Trees located within the amenity space will be in tree grates or in raised curbs for multiple plantings. Trees in grates or in raised curbs should utilize structural engineered soils to promote growth and plant vitality.

Figure 1.22 Representative layout east of Lake Avenue.

Typical Intersections

Typical Intersections

Figure 1.23 illustrates a typical intersection, and the alignment of the sidewalks and crosswalks. This alignment creates a continuous pedestrian route along the street, making block-by-block travel easier and safer. In constrained conditions, combined pedestrian curb ramps will be necessary, but crosswalks will still align for a continuous route.

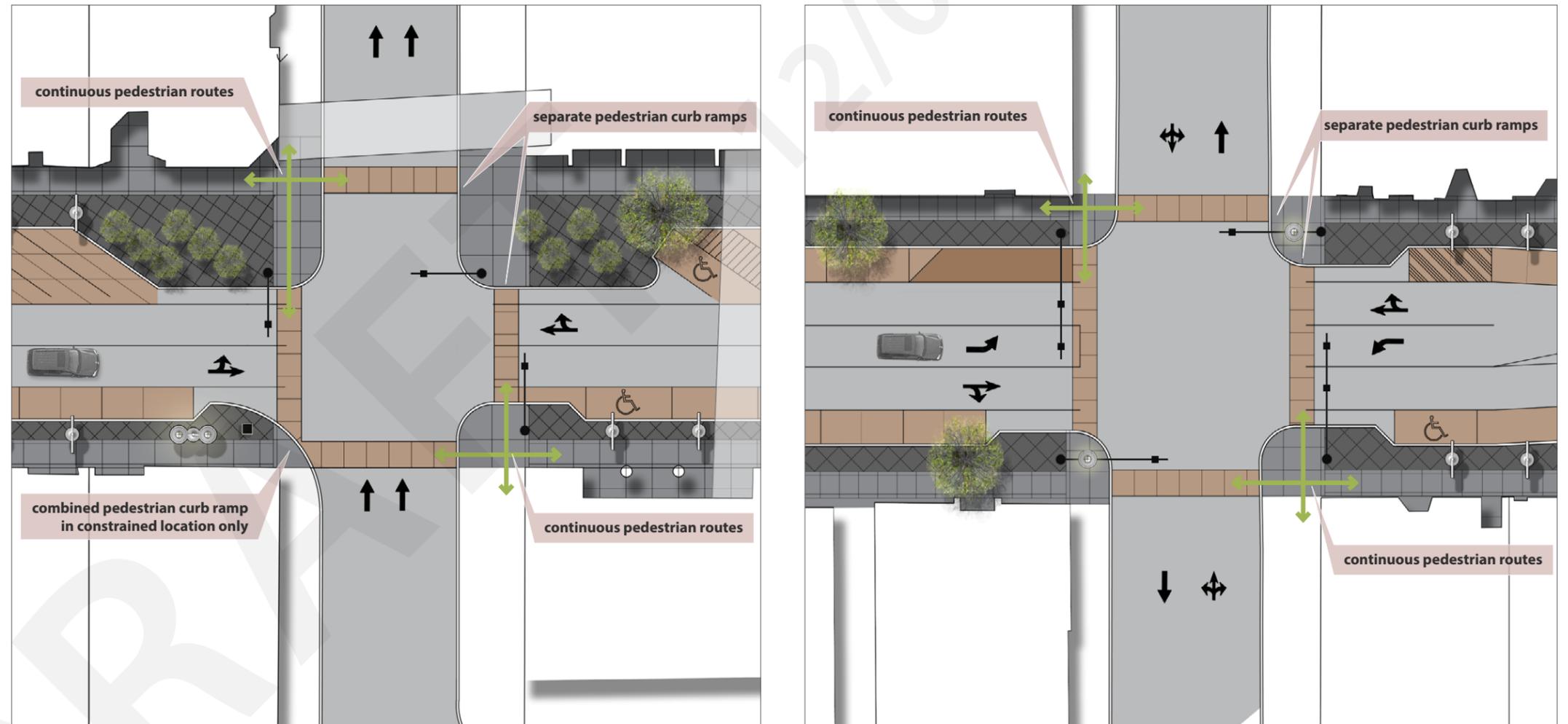
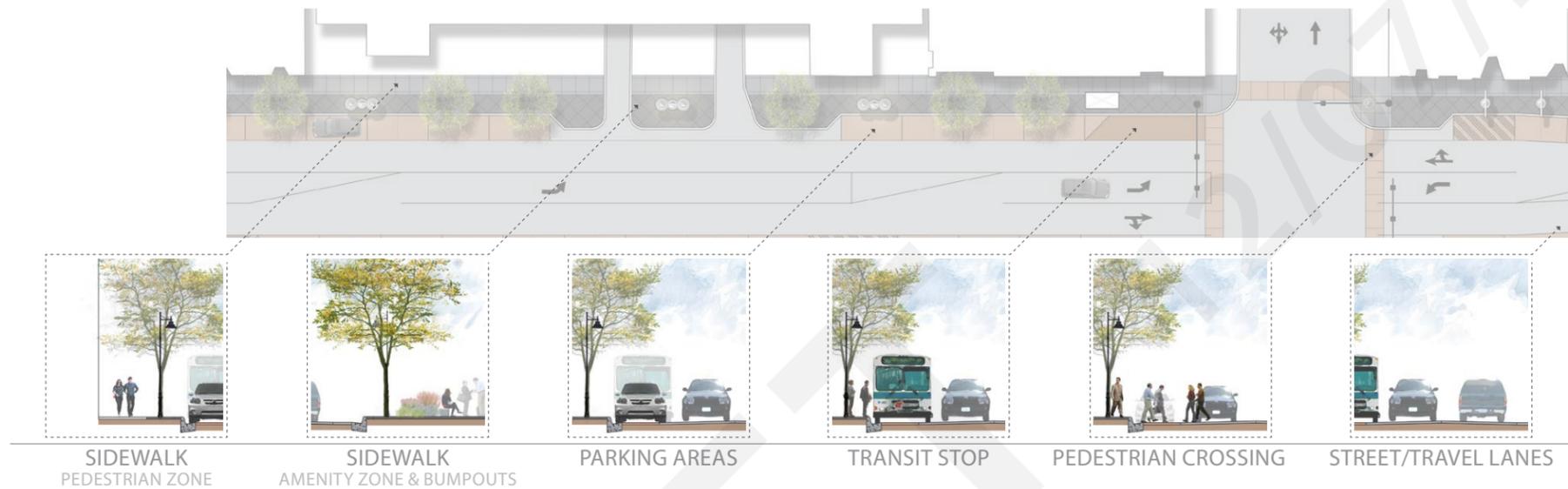


Figure 1.23 Typical intersections west and east of Lake Avenue.



Surface Materials

Surface material choice, including the color and texture, will be an important visual cue as to the role and function of the space within the broader roadway and sidewalk area. Six distinct spaces comprise the Superior Street corridor, each with a specific role and designation. These areas or zones, their function and recommended materials are summarized below.

- «**Street/travel lanes**—vehicle circulation and travelled lanes; standard concrete, no additional color or special finish
- «**Designated parking areas**—parallel or diagonal spaces; either standard concrete with distinctive scoring, or, integral colored concrete with distinctive scoring
- «**Transit stops**—designated transit vehicle stop; either standard concrete with distinctive scoring, or, integral colored concrete with distinctive scoring
- «**Pedestrian crossings**—designated pedestrian crossings at intersections; colored concrete of a contrasting color to the street surface, or, zebra pattern thermo-plastic inlay
- «**Sidewalk pedestrian zone**—pedestrian circulation unimpeded by vertical elements or street furniture; either colored concrete with light broom finish and scoring, or, sparkle grain concrete with light broom finish and scoring
- «**Sidewalk amenity zone and bump outs/curb extension**—area for pedestrian amenities, landscaping, lighting, programmable space, and public art; colored concrete with light broom finish and decorative scoring

	SIDEWALK PEDESTRIAN ZONE	SIDEWALK AMENITY ZONE & BUMPOUTS	PARKING AREAS	TRANSIT STOP	PEDESTRIAN CROSSING	STREET/TRAVEL LANES
PREFERRED	 <p>SPARKLE GRAIN CONCRETE</p> <ul style="list-style-type: none"> •No color, sparkle appearance •Light broom finish w/ scoring 	 <p>CONCRETE</p> <ul style="list-style-type: none"> •Charcoal •Integral color •Light broom finish w/ scoring 	 <p>COLORED CONCRETE</p> <ul style="list-style-type: none"> •Light brown tone •Integral color 	 <p>COLORED CONCRETE</p> <ul style="list-style-type: none"> •Medium brown tone •Integral color w/ scoring •Light broom finish w/ scoring 	 <p>COLORED CONCRETE</p> <ul style="list-style-type: none"> •Light brown tone •Integral color 	 <p>STANDARD CONCRETE</p>
ALTERNATE	 <p>CONCRETE</p> <ul style="list-style-type: none"> •Light gray •Integral Color •Light broom finish w/ scoring 	N/A	 <p>STANDARD CONCRETE</p>	 <p>STANDARD CONCRETE</p>	 <p>CONCRETE WITH THERMOPLASTIC ZEBRA PATTERN</p>	N/A

Figure 1.24 Streetscape materials.

Bump-outs/Curb Extensions

Bump-outs, also referred to as curb extensions, are recommended for placement at the ends of each block. Bump-outs provide traffic calming and increase pedestrian safety by increasing a pedestrian's view of traffic movement while decreasing the crossing distance of the street.

Stakeholder input during the Superior Street design process requested space for civic festivals and celebrations, business area events, public art and outdoor dining space. Bump-outs provide the necessary space, form and support functions to accommodate these needs. Elements can be arranged to allow for snow storage and removal, necessary operations and maintenance functions, and to reinforce pedestrian movement patterns. Several conceptual layouts illustrate how bump outs can be designed to accommodate a variety of functions and needs during various seasons. Four concepts illustrate representative options.

Concept A

Festival Space-Larger bump outs present space for civic gatherings or business marketing events. Trees, landscaping, and streetscape furniture provide a backdrop to frame the space. Electrical power, additional lighting and other support features can be incorporated to accommodate vender exhibits, rain canopies, additional seating or seasonal exhibits. By city permit, community festivals and civic gatherings could also take advantage of on street parking areas. Diagonal spaces would be the most effective for festival space given their size, depth and protection provided by the bump outs.

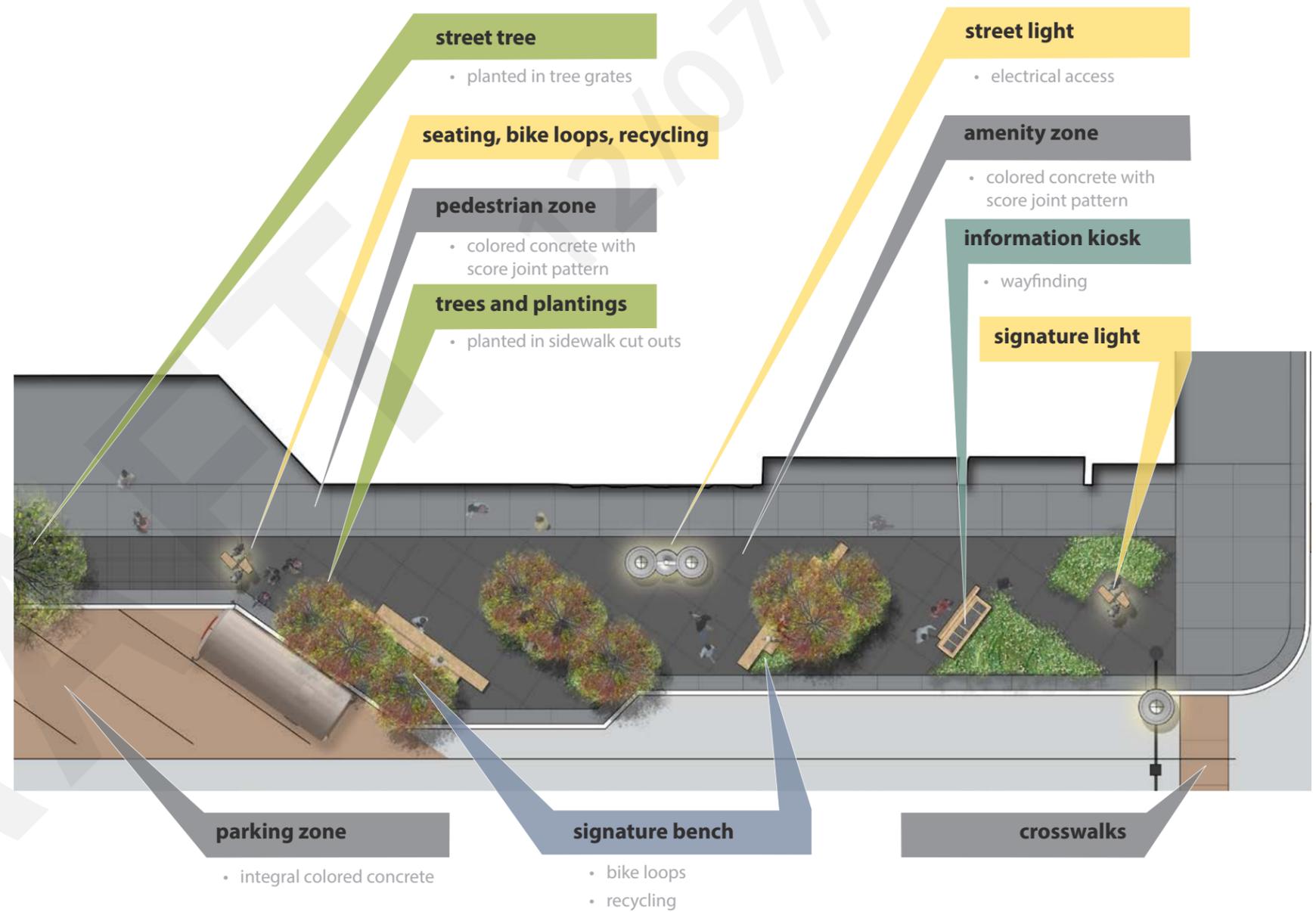
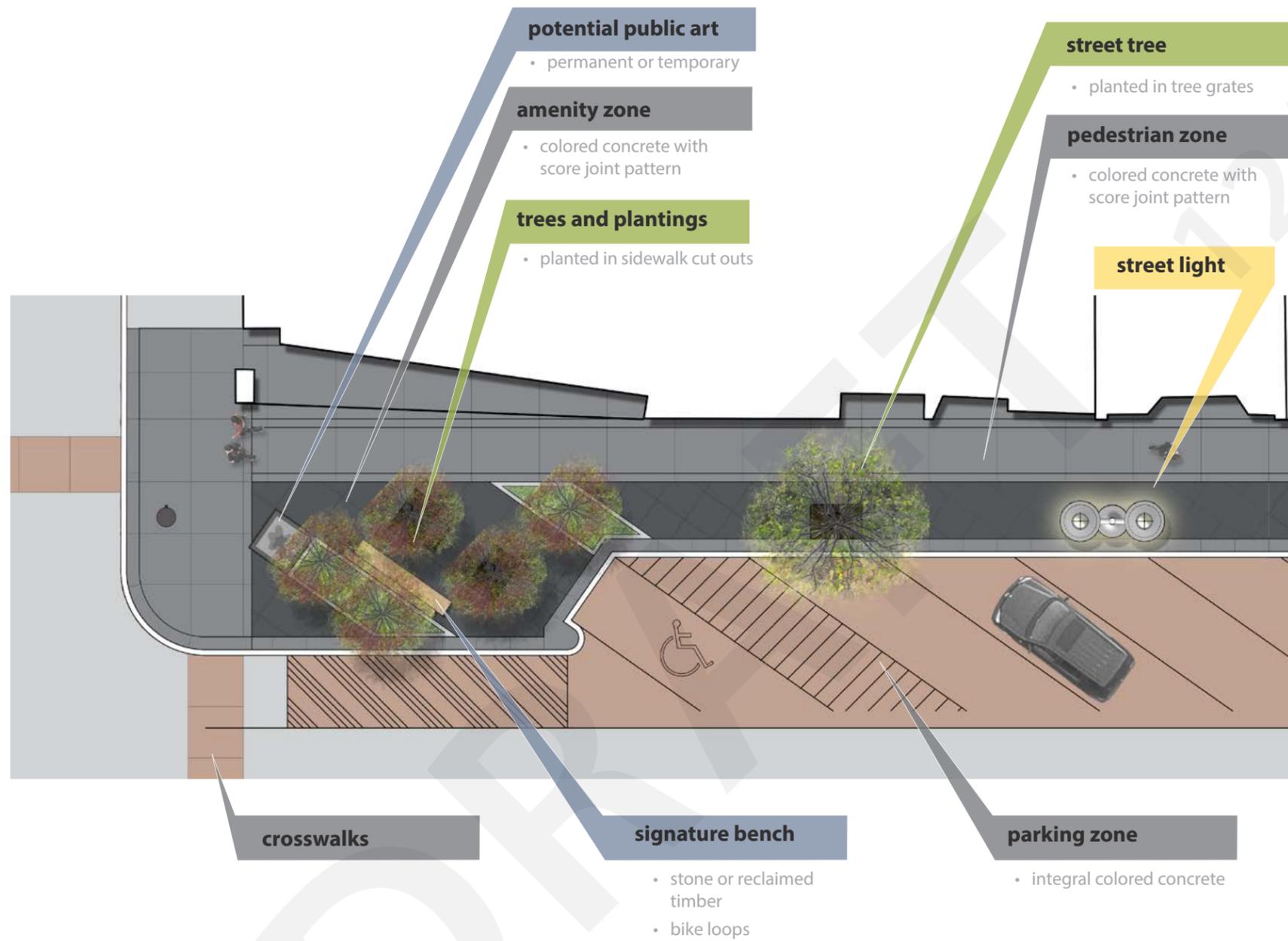


Figure 1.25 Bump-out condition, Concept A: Festival Space.



Concept B

Public Art Space—Artistic expression can be exercised in many locations throughout Superior Street. Smaller bump outs provide intimate settings for both permanent and temporary art installations. Landscaping and seating can be arranged to protect the art elements from parking, snow removal and traffic movement. Seating also provides the opportunity to enjoy the exhibit in an “eddy” outside of the main pedestrian and traffic flow.

Figure 1.26 Bump-out condition., Concept B: Public Art Space.

Bump-outs

Concept C

Outdoor Café-Seasonal outdoor cafés can energize the streetscape and provide interesting opportunities for coffee, food and libations. Bump outs can be configured for tables and chairs, supportive electrical needs, and serving areas. A city permit would be required.

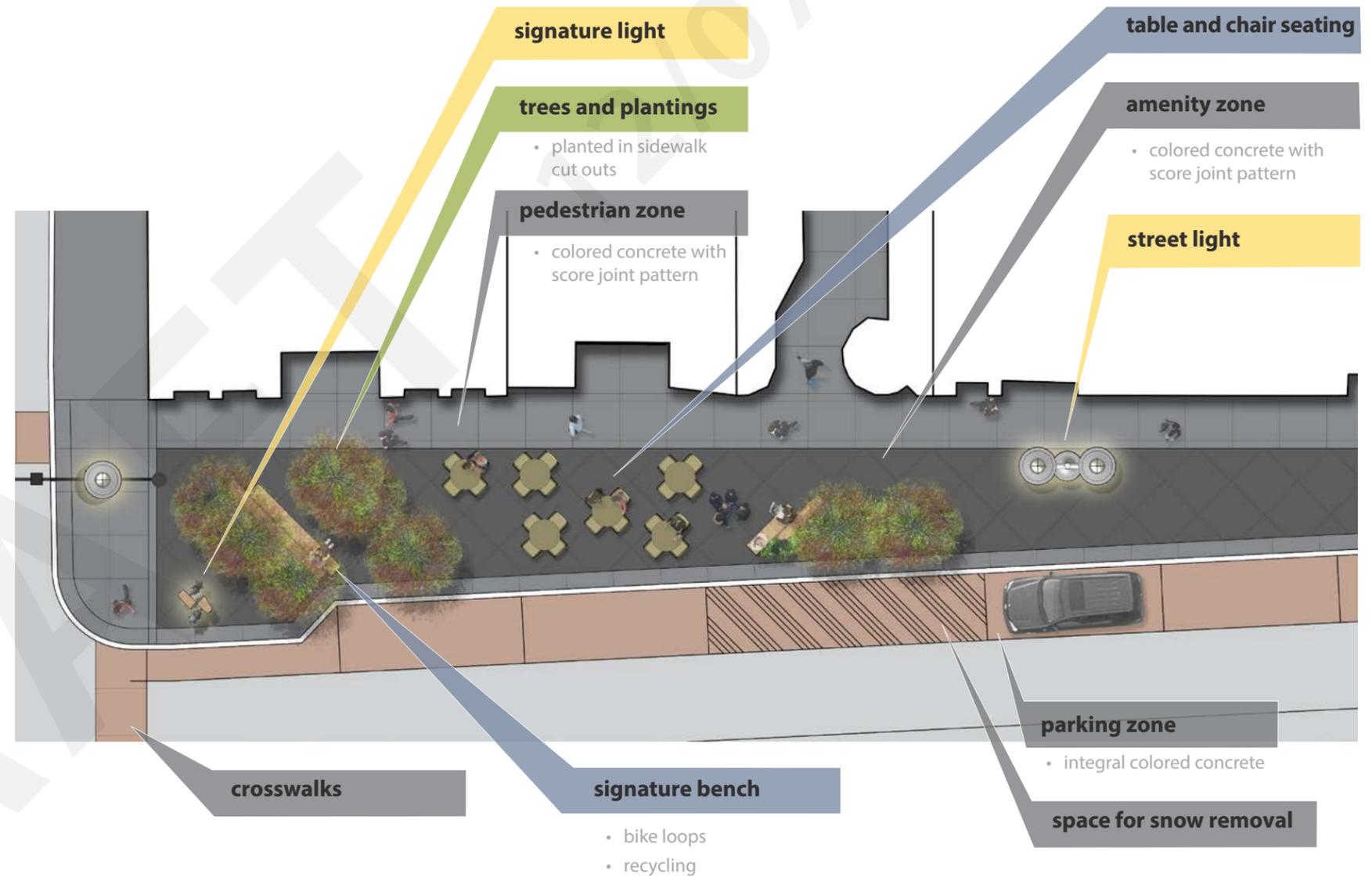
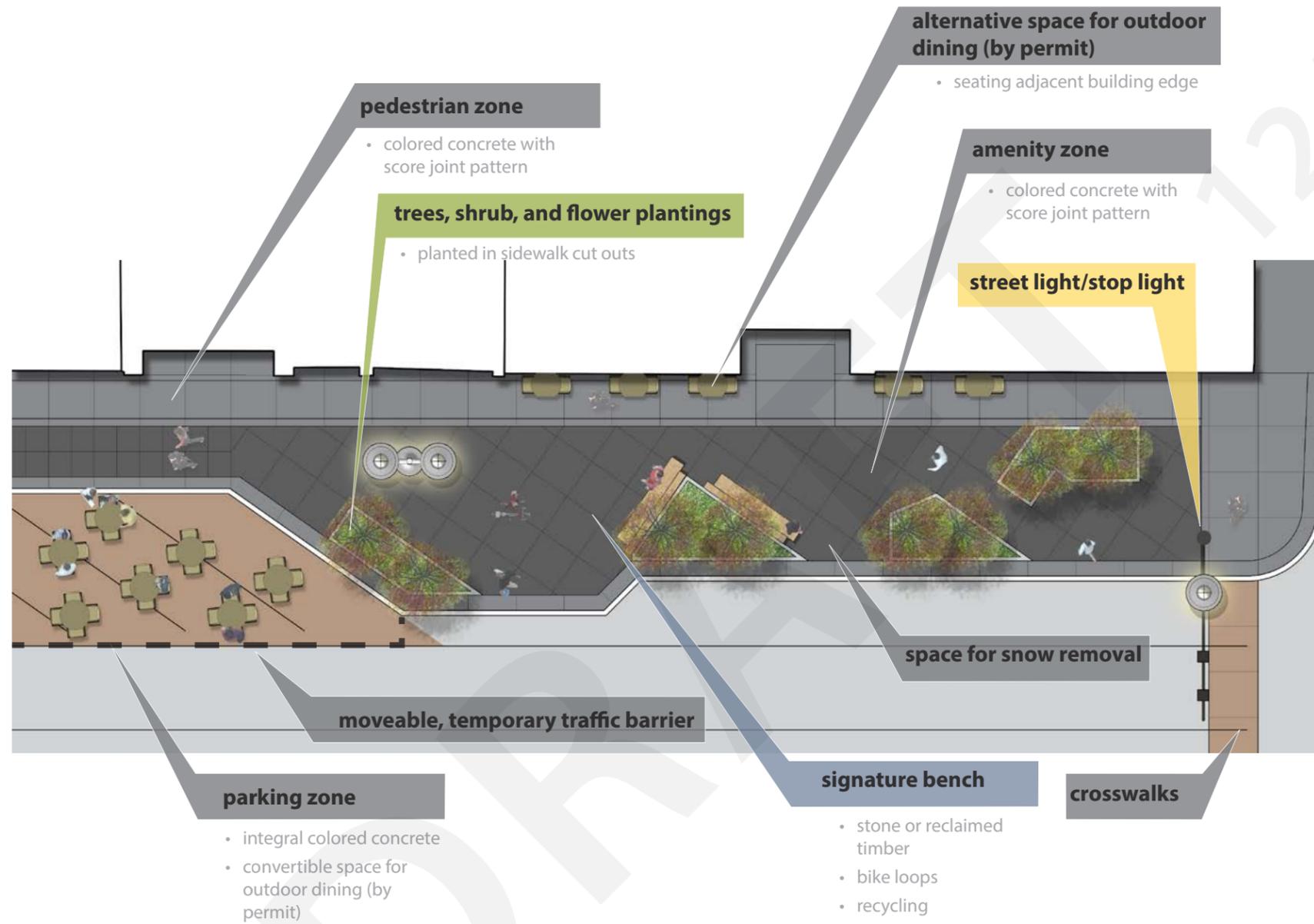


Figure 1.27 Bump-out condition, Concept C: Outdoor Cafe.



Concept D

Convertible Parking/Café Space-Additional outdoor eating opportunities exist beyond full use of a bump out. With a city permit, tables can be set at the building/right of way edge in a manner to allow for pedestrian flow and adjacent a coffee shop, café or restaurant. Additional seating could occur within on street parking areas. The city can provide, by permit, short term use of public on street parking for dining. Conditions would apply including protective barriers or devices to define the dining area and protect guests. Permits frequently determine the length of use, hours of operation, beverages allowed and other operation considerations.

Figure 1.28 Bump-out condition, Concept D: Convertible Parking/Cafe Space.

Bump-outs

Figure 1.29 and Figure 1.30, Bump out Configuration/Potential Uses, summarize by intersection the location and size of bump outs or curb extensions. During the preliminary design process, public involvement provided an initial understanding of the opportunities and preferences for uses, activities and elements that could be accommodated at each of the locations. The table provides a summary of these potential uses based upon the space available, the adjacent land use and location along Superior Street.

As the design process evolves, ongoing input should be sought from the community, business and property owners and the Greater Downtown Council as to the layout and design of each individual location. Discussions should include likely uses, the potential for programmed activities or use by permit, operations and maintenance needs, and utility requirements.

LOCATION	SIZE	SEATING/ AMENITIES	BIKE FACILITIES	LANDSCAPING	FESTIVALS	PUBLIC ART	CAFE
6th Ave West							
NE Corner	Large	X	X	X	X	X	-
SE Corner	-	-	-	-	-	-	-
SW Corner	Small	X	X	X	-	-	-
NW Corner	Small	X	X	X	-	-	-
5th Ave West							
NE Corner	Small	X	X	X	-	X	-
SE Corner	-	-	-	-	-	-	-
SW Corner	Small	X	X	X	-	X	-
NW Corner	-	-	-	-	-	-	-
4th Ave West							
NE Corner	Medium	X	X	X	-	X	-
SE Corner	-	-	-	-	-	-	-
SW Corner	Small	X	X	X	-	-	-
NW Corner	Large	X	X	X	X	X	-
3rd Ave West							
NE Corner	Medium	X	X	X	X	X	X
SE Corner	Small	X	X	X	-	-	-
SW Corner	Small	X	X	X	-	-	-
NW Corner	Medium	X	X	X	X	X	-
2nd Ave West							
NE Corner	Medium	X	X	X	X	X	-
SE Corner	-	-	-	-	-	-	-
SW Corner	Small	X	X	X	-	-	-
NW Corner	Large	X	X	X	X	X	X
1st Ave West							
NE Corner	Large	X	X	X	X	X	-
SE Corner	-	-	-	-	-	-	-
SW Corner	Small	X	X	X	-	-	-

Figure 1.29 Bump-out configurations and potential uses by location.

LOCATION	SIZE	SEATING/ AMENITIES	BIKE FACILITIES	LANDSCAPING	FESTIVALS	PUBLIC ART	CAFE
NW Corner	Large	x	x	x	x	x	x
Lake Ave							
NE Corner	Small	x	x	x	-	-	-
SE Corner	Medium (Plaza)	x	x	x	x	x	-
SW Corner	(MP Plaza)	x	x	x	x	x	-
NW Corner	-	-	-	-	-	-	-
1st Ave E							
NE Corner	Small	x	x	x	-	-	x
SE Corner	-	-	-	-	-	-	-
SW Corner	Small	x	x	x	-	-	-
NW Corner	-	-	-	-	-	-	-
2nd Ave E							
NE Corner	Small	x	x	x	-	-	-
SE Corner	Small	x	x	x	-	-	-
SW Corner	Small	x	x	x	-	-	x
NW Corner	-	-	-	-	-	-	-
3rd Ave E							
NE Corner	-	-	-	-	-	-	-
SE Corner	Small	x	x	x	-	-	-
SW Corner	Small	x	x	x	-	-	-
NW Corner	-	-	-	-	-	-	-
4th Ave E							
NE Corner	-	-	-	-	-	-	-
SE Corner	-	-	-	-	-	-	-
SW Corner	-	-	-	-	-	-	-
NW Corner	-	-	-	-	-	-	-

Figure 1.30 Bump-out configurations and potential uses by location, continued.

Temporary Spaces/Festival Areas



Figure 1.31 Precedent images of convertible, flexible spaces.



Figure 1.32 Precedent images of convertible, flexible spaces continued,

Public Art Themes

Public involvement during the planning process indicated heightened interest for public art to be included in the streetscape design. Feedback directed that public art themes should communicate, “Be Duluth!” through expressions of the region’s indigenous natural qualities, an expression of the city’s history, and an understanding of its culture. As illustrated in Figure 1.33 and Figure 1.34, the city is rich in opportunities for art expression ranging from native rocks and woodlands to tales of Lake Superior to images of Duluth leaders and historical figures.

Public art can be expressed along Superior Street in many ways: kinetic, embedded, performative and temporary. Art that is embedded must be designed and constructed mindful of the street’s maintenance and operations requirements. Durability is paramount. Performative and temporary art can be undertaken through programmed activities hosted by the Greater Downtown Council, the City of Duluth and/or related arts organizations. Installations and events within the street and sidewalk right of way will require a permit from the City. Kinetic art has an aspect of movement to it, either the perception of movement or depending on movement for its effect.

The streetscape layout design provides abundant space opportunities for public art. Embedded art can be incorporated into many streetscape elements ranging from sidewalk surface to street furniture to banners and lighting. Space defined by bump-outs (curb extensions found at the end of blocks), provides ample opportunity for temporary or pop up art installations and for performing art.

Integration of public art into the streetscape should be addressed during detail design. Capital, operations and maintenance costs must be accommodated. Artists should be engaged to assist in arriving upon design elements that are expressive to the public but responsive to the street’s challenging conditions. This discussion should occur as early as possible to allow design, fabrication and installation to occur during the street/streetscape construction process.



Figure 1.33 Public art themes and possible applications.

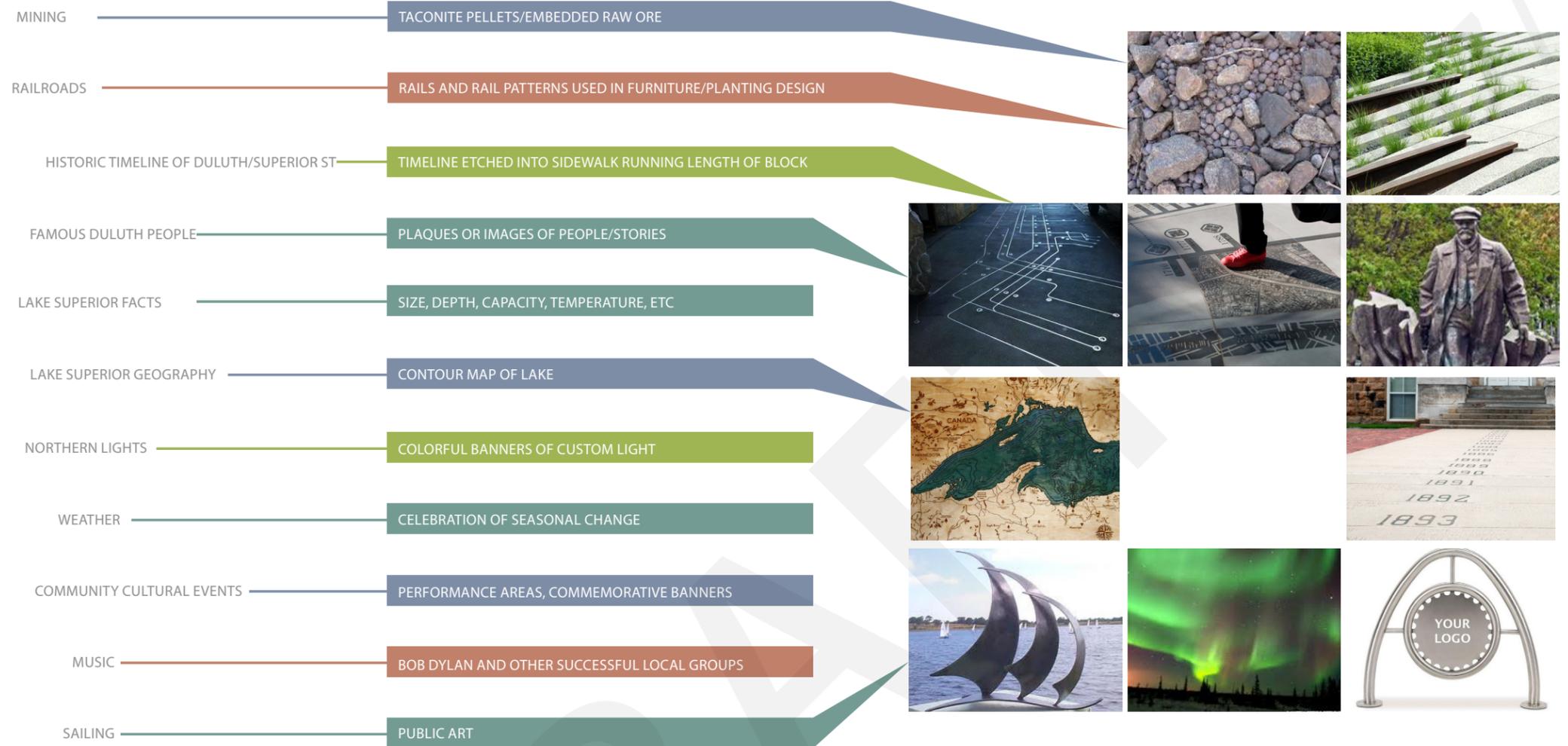


Figure 1.34 Public art themes and possible applications continued.

Lighting/Electrical Power

Lighting is an integral component to a successful street and streetscape environment. Illumination of street and sidewalk surfaces contributes to the safety and security of all users. In addition, the vertical nature of light poles, bases and luminaires are dominant visible elements and assist in the corridor’s aesthetics.

The City of Duluth has established a lighting vocabulary that directs the choice of light poles, bases and luminaires. This vocabulary is consistent with the variety of building architectural styles found along the corridor, ranging from historic to more contemporary.

The lighting concept recommended for Superior Street is a uniform height pole with both single and twin luminaires. Additional lighting would occur atop traffic signal poles to increase intersection safety.

Performance criteria for lighting will meet or surpass the standards and guidelines established by the American Association of State Highway and Transportation Officials (AASHTO) and the Illumination Engineering Society (IES). Specific design criteria recommended for the Superior Street improvements are listed in Figure 1.35.

The introduction of LED light sources has tremendously increased the tools and options available for street lighting. During the detail design phase, decisions can be made regarding the use of rheostats to increase or decrease light levels, timers to adjust light levels consistent with time of day, colorful lighting for festivals and events, and illumination levels to augment or reinforce activity areas.

The detail design phase should also address options for decorative banners, icon emblems attached to light poles, and seasonal or festive decorations. These are important considerations in order to make certain that pole wind loading and electrical power access is adequate for the intended events and uses.

Electrical power needs for festivals, programmed business events and activities, tree Tivoli lights, public art, civic use and so on should also be addressed during detail design. These activities can be accommodated through secure outlets within the light poles and through free standing, locked outlets. Discussions should address the amperage required, the source, metering and payment, and security concerns.

Lighting Design Criteria	
Desired Light Level	1.2 foot candles
Desired Uniformity Level	3:1
Luminaire Mounting Height	20-22 feet
Spacing	100 feet (desired)
Double Luminaire per Pole	(Single luminaire as needed)
LED Light Source	250 watt (comparable)
Night Sky Compliant	
Illumination cutoffs for sensitive receptors such as second floor residential	
Maintenance access and security considerations compliant with city operations	

Figure 1.35 Lighting design criteria recommended for Superior Street.



Figure 1.36 Lighting images including holiday lighting, dark sky compliant standards and examples, and LED lighting on the Lowry Bridge in Minneapolis.

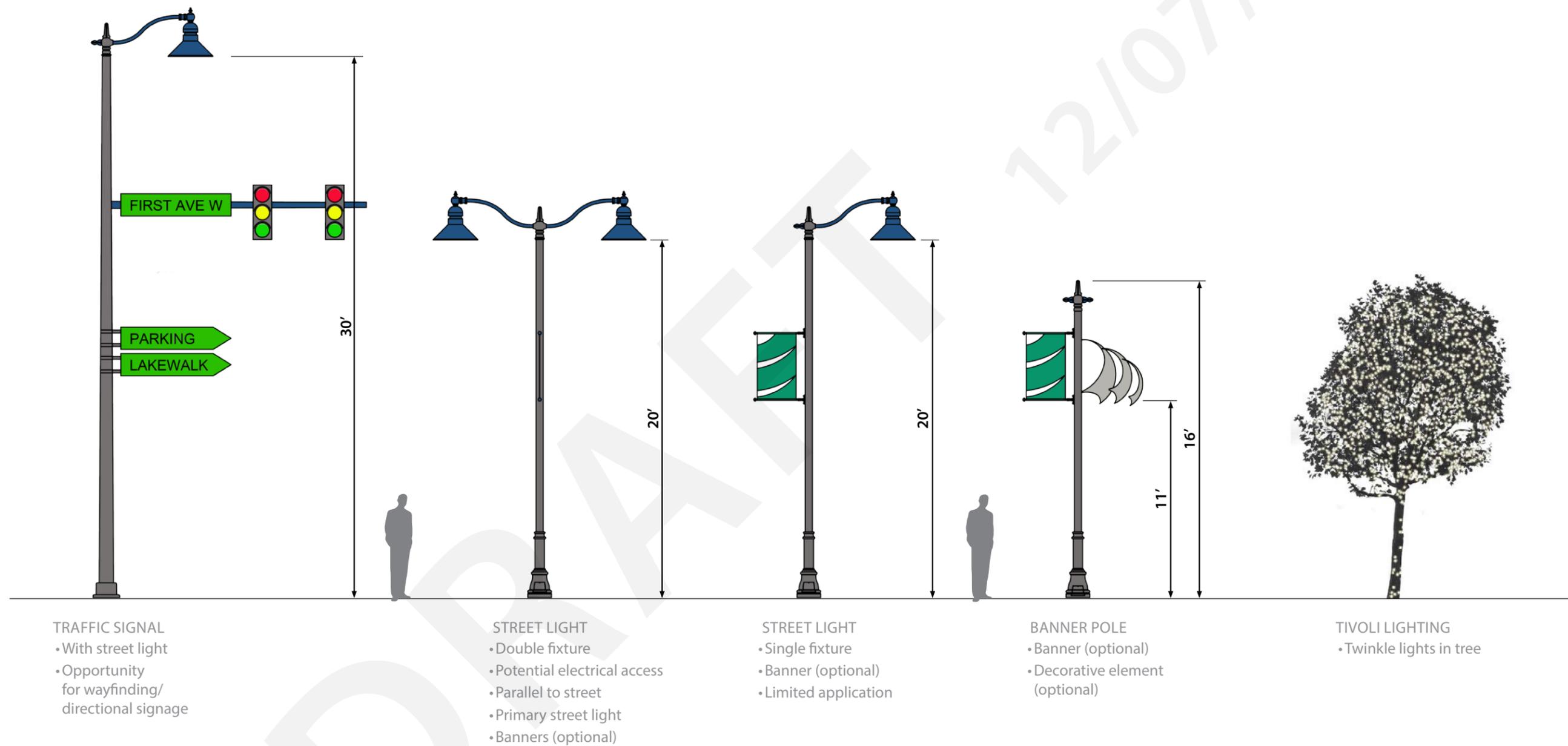


Figure 1.37 Lighting vocabulary and vertical elements.

Landscaping Concept

Vegetation is an important part of the streetscape for several reasons. It provides seasonal interest, color and softness to the street, making it a more appealing environment for pedestrians. Trees, shrubs, perennials and annuals contribute to the design vocabulary, creating a consistent and recognizable district. Vegetation also provides environmental benefits such as reduced air pollution, shade, and stormwater mediation.

The proposed plants for Superior Street are primarily native to the region. They are drought and salt tolerant to withstand harsh urban conditions and the rigors of winter maintenance. Their placement responds to site visibility requirements, and reinforces vehicle, bicycle, and pedestrian safety.

Trees

Trees play an essential role in the streetscape: they help frame the street, create pedestrian scale, provide shade, screen unsightly structures, and emphasize views. They also face challenges in the urban environment due to salt, pollution, compacted soils, and limited room to grow. On Superior Street, underground vaults inhibit tree planting in many places along the street.

The tree species selected for Superior Street were chosen based on environmental, aesthetic, and structural factors. They are able to withstand urban conditions, are low-maintenance and attractive. There is a mix of overstory and ornamental trees to accommodate space restrictions and design intent along the street. Planting multiple species is recommended to increase diversity and resilience. In addition, planting the clump form of certain species in appropriate locations can increase the impact of a tree in areas with otherwise limited vegetation.

Trees will be planted to minimize conflicts with signs, lighting, and traffic signals. In addition, tree placement needs to take into account business and retail windows and signs, and should be coordinated with adjacent business and retail interests. In some instances they will be in tree grates, in others within a 6" concrete curb planter along with shrubs and perennials. Using structural soils is strongly recommended to provide adequate room for tree roots. Deciduous trees should have a minimum of 3-4 inch caliper, and coniferous trees should be a minimum of six feet in height at the time of planting. Tree vitality and durability is a project



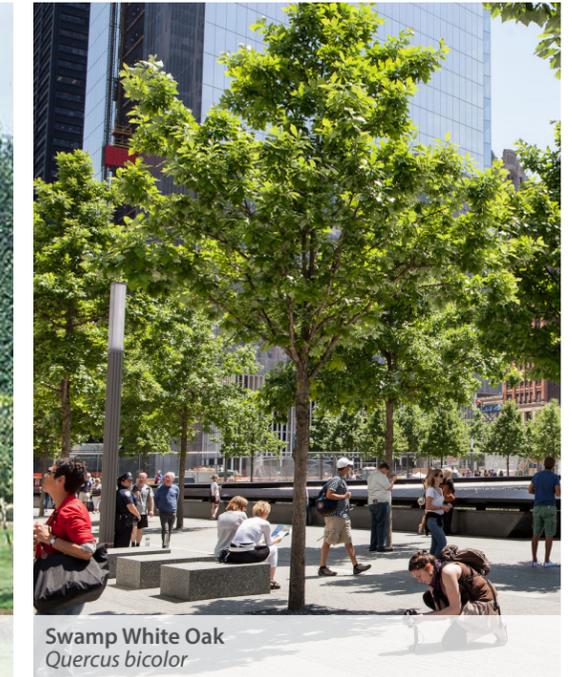
Little Leaf Linden
Tilia cordata 'Greenspire'



Hackberry
Celtis occidentalis



Ironwood
Ostrya virginiana



Swamp White Oak
Quercus bicolor

Figure 1.38 Tree recommendations for Superior Street.



Dwarf Bush Honeysuckle
Diervilla lonicera



Black Chokeberry
Aronia melanocarpa



Sumac 'Gro-Low'
Cornus stolonifera



Spirea 'Anthony Waterer'
Spirea japonica

Figure 1.39 Shrub recommendations for Superior Street



Siberian Iris
Iris sibirica



Catmint
Nepeta 'Walker's Low'



'Happy Returns' Daylily
Hemerocallis 'Happy Returns'



Annuals
Various species



Vines
Various species



Hanging Baskets



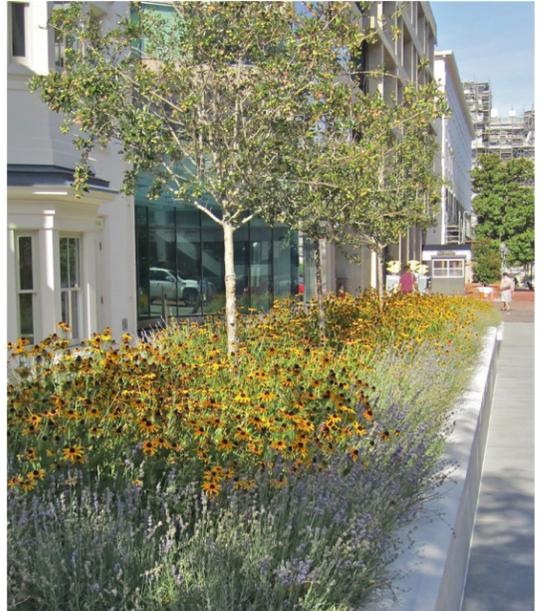
Plants in Containers



Vines on Vertical Screen



Tree Grate



Planting within Concrete Curb

Figure 1.40 Plant recommendations and applications for Superior Street.



Tree Trench Installation



Trees in Trenches



Structural Soil Detail



Irrigation in Perennial Bed

Figure 1.41 Images of tree trenches, structural soil and irrigation.

objective. Engineered soils in tree trenches should be used for all tree plantings within grates or curbed planters. This approach will reduce soil compaction associated with the urban environment and will promote needed watering, drainage, and aeration.

Shrubs and Perennials

Like trees, shrubs and perennials enhance the streetscape, highlighting and framing areas such as gathering spaces, bump-outs and other street features. They bring seasonal color and texture to the street at the pedestrian level, making it an appealing place to walk, gather and linger.

Shrubs and perennials will be planted within a 6" concrete curb to protect them from salt and mechanical injury. While a diversity of species should be planted throughout the streetscape, groupings of the same species should be clumped together for aesthetic purposes. Planting soils should be a minimum of 24 inches deep.

The sizes of shrubs and perennials should be as follows:

«Shrubs should be of a minimum five gallon container size at time of planting.

«Perennials should be of a minimum one gallon container size at time of planting.

All planting should follow the spacing requirements for that species as recommended by the American Standard for Nursery Stock of the American Nursery and Landscape Association. A list of recommended species is provided within this section.

Vines

In areas where it is not feasible to have trees, vines can be used as a vertical vegetative element. Trellises can be incorporated into the streetscape in various ways, such as gateway structures, planters, walls, and seating elements. Vine species can be perennial or annual, depending on the intended use and design intent. Annuals will need to be replaced every year, while perennials will come back every year—however not every location is suitable to perennial plantings, as plants not planted directly in the ground are subject to extreme temperatures and will not survive the winter.

Container Plants

Planted flower pots and hanging baskets will be the primary means of adding color to Superior Street. Primarily annuals, they can be changed seasonally and are movable, helping to define space in specific areas such as bump-outs, public gathering spaces, and storefront entries. They reinforce a sense of unity and design vocabulary along the street. Container plants will need manual watering, as there will be no irrigation in the planters.

Soil Mix and Mulch

The long term health and viability of plants begins with the soil mix within which they are planted. For Superior Street, all planting beds should have a uniform mixture of 1 part sand, 1 part peat, and 1 part top soil by volume. Structural soil is recommended for trees planted within paved areas. Planting beds should be top dressed with mulch to retain moisture and suppress weed growth; a shredded cedar species of wood ground bark, at 4" minimum depth and free of growth or germination inhibiting ingredients should be used.

Special Provisions and Planting Medium

The life span of street trees is often short due to a lack of space for root growth and compacted soil. Structural soil can increase the survivability of street trees in the urban environment, as it promotes root growth while also providing structural support to the surrounding pavement. It is made from a combination of gap-graded gravels, clay loam, and hydrogel that can be compacted to pavement design requirements. Tree roots penetrate the gaps between the gravel particles, the clay loam provides the growing medium and the hydrogel holds it all together.

When structural soil is used, trees are generally planted in a trench containing structural soil instead of a typical tree pit, allowing the roots freedom of movement. Pavers or tree grates can be used to

cover the surface at the tree's base, and allow for future adjustments as the tree grows.

Structural soil can be costly because it is proprietary. The most common and most tested structural soil was developed and patented by Cornell University, called (CU) structural soil. However, structural soil is cost effective if installed when the streetscape will be part of new construction, or when the entire streetscape needs to be renovated, as is the case for Superior Street. It is strongly recommended that structural soil be used on Superior Street to increase the longevity of the street trees.

Irrigation

If used, irrigation would occur in specific areas such as planting beds at bump-outs. The irrigation system would be designed to reduce the total coverage area, cost and maintenance. Smart systems can be designed to turn on only in dry spells, and if used, would increase the overall survivability of plants.

PERENNIALS						
Name	MN Native Status	Height	Width	Bloom Time	Application	Interest
'Happy Returns' Daylily <i>Heemerocallis 'Happy Returns'</i>		18"	—	July-August	Seasonal color/ texture massing	Yellow flowers, fragrant
Siberian Iris <i>Iris sibirica 'Ruffled Velvet'</i>		24"	—	June-July	Seasonal color/ texture massing	Violet flowers, interesting foliage
Catmint <i>Nepeta 'Walker's Low'</i>		24-30"	30"	June-Sep	Seasonal color/ texture massing	Blue-purple flowers
SHRUBS						
Dwarf Bush Honeysuckle <i>Diervilla lonicera</i>	Y	2-3'	2-3'	June-July	Texture massing, low spreading	Attractive foliage
Black Chokeberry <i>Aronia melanocarpa</i>	Y	4-6'	3-6'	May	Accent, irregular hedge, screening	White flowers in spring, fall color
Sumac 'Gro-Low' <i>Cornus stolonifera</i>	Y	2'	6-8'	Spring	Texture massing, low spreading	Yellow flowers in spring, fall color
Spirea 'Anthony Waterer' <i>Spirea x bumalda 'Anthony Waterer'</i>		3-4'	3-5'	June-Sep	Accent, irregular hedge, screening	Rose-pink flowers all season
TREES						
Little Leaf Linden <i>Tilia cordata 'Greenspire'</i>		50'	30'		Street tree	Pyramidal form, tolerant of urban conditions
Hackberry <i>Celtis occidentalis</i>	Y	50-75'	50'		Street tree	Fast growing, tolerant of urban conditions
Ginkgo <i>Ginkgo biloba</i>		40-60'	20-30'		Street tree	Slender, pyramidal form, non-fruiting male variety
Ironwood <i>Ostrya virginiana</i>	Y	30-50'	25'		Street tree	Tolerates shade and urban conditions
Swamp White Oak <i>Quercus bicolor</i>	Y	50-60'	40-50'		Street tree	Drought, poor soil tolerant, disease resistant
Japanese Tree Lilac <i>Syringa reticulata</i>		25-30'	20-25'		Street tree	Fragrant flowers, disease and pest-resistant

Figure 1.42 Recommended plant material table.

Furniture and Streetscape Elements

Street furniture and furnishings provide an important functional and aesthetic role for streetscape success. The elements should establish a vocabulary that help unify the streetscape and reinforce its design identity. Materials and finishes must be durable and resistant to weathering, vandalism, and equipment damage. Post construction availability should be anticipated. Final selection of specific elements will occur in the detail design phase.

The streetscape component of Superior Street is the space from back of curb to building edge. Pedestrian circulation, amenities, seating areas, programmable space and vertical elements are included. Primary elements that comprise the streetscape include lighting, landscaping, color and surface finishes, furnishings, public art, gateway elements, and wayfinding signage. This mix of elements provides the streetscape with its visual character, its sense of scale, and civic identity. Each element has a role and function; however, each should be selected to reinforce Superior Street's appearance. A summary of each element follows.

The recommended streetscape elements for Superior Street are constructed of recycled, local products when possible. Materials such as timber, stone, and steel reinforce Duluth's identity, affirming Superior Street's sense of place. They are durable and able to hold up to seasonal extremes, while also being aesthetically compelling.

Furniture

Street furniture plays a strong role in creating an attractive and functional pedestrian environment. The elements selected should reinforce other elements including the street lighting while complementing the Superior Street building architectural character. Select furniture could also host or be forms of public art.

Street furniture includes benches, trash receptacles and recycling containers, and bicycle racks. Selected furniture should be durable, replaceable, comfortable and convenient for use.



Signature Bench A: Native northern Minnesota stone



Signature Bench B: Reclaimed timber



Standard bench A: Durable metal, silver finish



Standard bench B: Durable metal, black finish

Figure 1.43 Proposed seating elements recommended for Superior Street.



Standard bench C: Durable metal, dark brown finish



Standard Bench D: Steel with pattern



Standard bench E: Durable metal, umber finish

Figure 1.44 Proposed seating elements recommended for Superior Street continued.

Seating

Several types of benches are recommended for Superior Street: two signature benches and a series of standard benches. The signature benches would be used in specific locations, such as bump-outs, where there is more opportunity for gathering. Signature Bench A is constructed of Northern Minnesota stone, and Signature Bench B is made of timber and steel. The distinct form of these benches and their materials reflect the rugged north shore landscape and local industries, while being durable and easy to maintain.

The standard benches are constructed of a durable metal, and would be placed more prolifically along the streetscape. A standard bench would be used at mid-block locations where there are space restrictions but still a desire for seating. The options for this bench are simple with clean lines, and blend in with the other streetscape elements. A specific standard bench will be selected in the detail design phase, however, the bench may represent a variety of forms, lengths and back or backless models.

Other Street Furniture

Digital parking meters

Digital parking meters are being implemented throughout Duluth, and the style of meter will be consistent across the city. They allow for cashless transactions for street parking.

Bike racks

Bike racks will be located in key places on every block—they are utilitarian objects that can be as basic as a single loop, or enhanced to be more unique. They provide an opportunity for public art or

identity propagation along the streetscape. A combination of basic bike racks and enhanced bike racks can also be used, with the enhanced bike racks only in select locations along the corridor.

Waste and Recycling Bins

Waste and recycling bins are a necessity on the streetscape, keeping the street clean of waste and debris. They should be easy to use and maintain, and generally blend into the background of the streetscape. The selection of waste and recycling bins will solicit input from operations staff building upon their experience with models found within the downtown area and the Lakewalk.

Seasonal Flower Planters

Seasonal planters will be placed throughout Superior Street—the recommended planters are durable and fit within the design vocabulary of the street. Seasonal planters should be removable for storage during the winter months.



Waste + Recycling Bin Option A



Waste + Recycling Bin Option B



Waste + Recycling Bin Option C



Signature Bike Rack

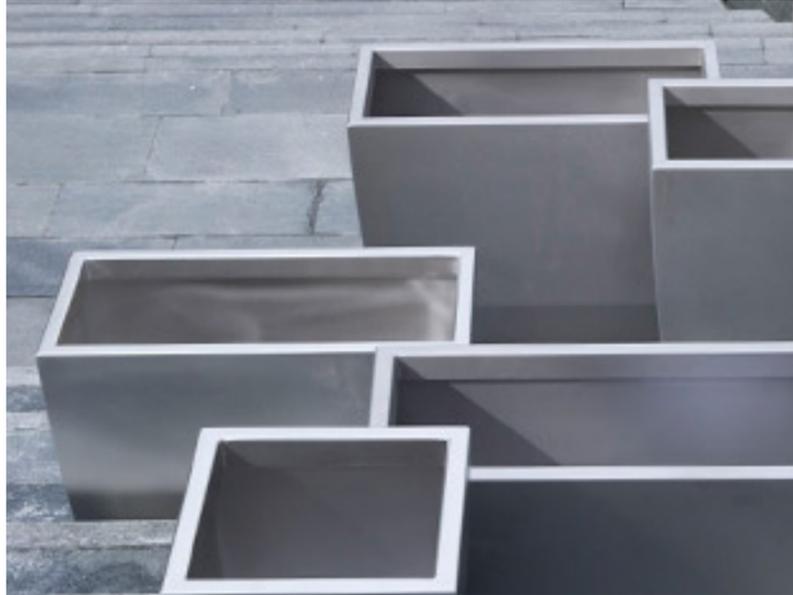


Standard Bike Rack



Standard Bike Rack

Figure 1.45 Street furniture options, including bike racks, waste and recycling bins.



Seasonal Flower Planter Option A: Durable metal



Seasonal Flower Planter Option B: Concrete



Seasonal Flower Planter Option B: Metal with pattern



Digital Parking Meter Station

Figure 1.46 Street furniture options, including the standard digital parking meter and seasonal flower planters.

Gateways and Connections

Gateway elements act as visual landmarks, indicating a point of transition from one place to another. On Superior Street, gateway elements will mark the entries to the Lakewalk at 1st Avenue East, mid-block just east of 2nd Avenue East, and in the plaza east of Lake Avenue. These gateway elements will be sculptural and tall enough to be seen from a block away. They will incorporate pedestrian scale signage and wayfinding, and may also have the potential to include special event notifications. They will be constructed of durable, regionally-sourced materials that reference Duluth identity and reinforce sense of place: indigenous stone, timber and steel. They have the potential to introduce vegetation into the landscape with vertical green screens and curbed planters that double as seating elements.

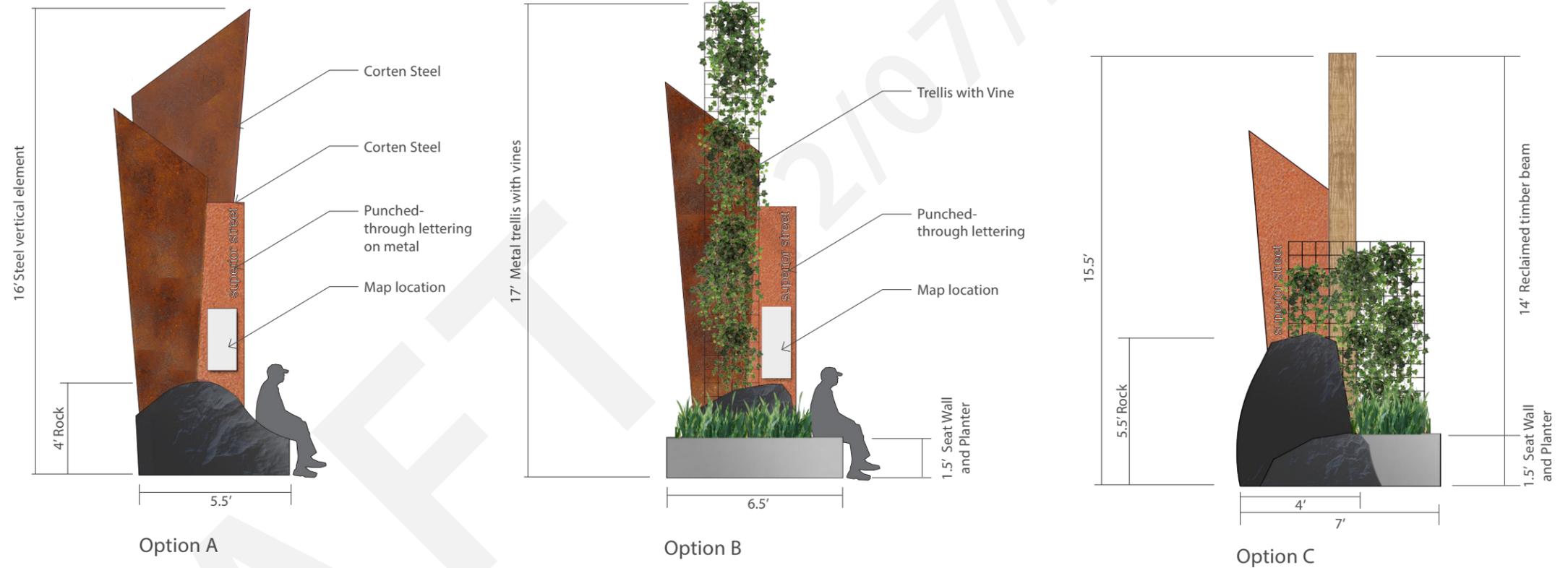


Figure 1.47 Gateway elements Options A, B and C

LEGEND

- RIGHT OF WAY LINE
- SIDEWALK PEDESTRIAN ZONE
- SIDEWALK AMENITY ZONE
- PARKING
- LOADING ZONE
- TRANSIT STOP
- SIGNAL POLE
- SIGNAL POLE W/ STREET LIGHT
- TRAFFIC SIGNAL (NO ARM)
- STREET LIGHT (DOUBLE LUMIN)
- BANNER POLE
- TRANSIT SHELTER
- ★ GATEWAY ELEMENT



Figure 1.48 Gateway element locations.



Figure 1.49 Examples of wayfinding signage.

Wayfinding and Signage

Along with orienting pedestrians, bicyclists and vehicles to various locales, wayfinding and signage contributes to an identifiable district. Signage can be designed with visual icons and symbols, color coding, and at various sizes and heights. On Superior Street, directional signs and panels on posts will be placed at key decision-making locations. Pedestrian signs will be lower panels, while vehicle wayfinding signs will be the tallest. They will point to significant downtown locations, including:

- « Parking
- « Public buildings
- « Skywalk access
- « Lakewalk/trails
- « Parks/plazas
- « Tourist amenities
- « Historic sites
- « Transit stops

The City of Duluth has several wayfinding and signage systems currently in place. During the detail design phase, wayfinding recommended for Superior Street should be coordinated with current signing to encourage a unifying appearance and approach.

4th Avenue West: Bump-out Design

This view shows the bump-out at 4th Avenue West on the north side of the street. A signature bench, trees, planters and an enhanced paving pattern makes this space attractive for gathering and relaxing. Hanging baskets, potted plants and banner poles bring seasonal color and life to the streetscape.

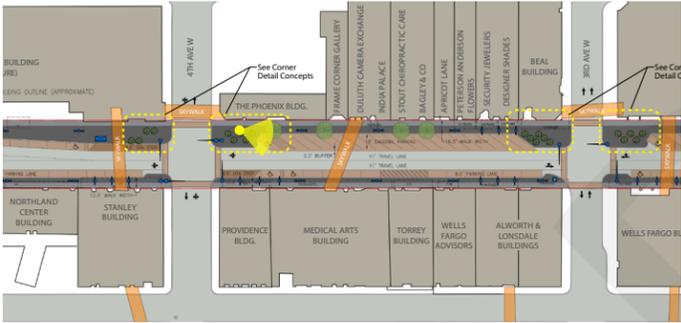


Figure 1.50 4th Avenue West on the north side of the street, looking east.



4th Avenue West: Flexible Space

This view of 4th Avenue West on the north side of the street shows the use of the diagonal parking stalls as expanded pedestrian space for cafe tables and music. This space could also be utilized for festivals, sidewalk sales, or markets among other things. Traffic barriers double as planters, with vertical trellises and vines providing screening from vehicles.

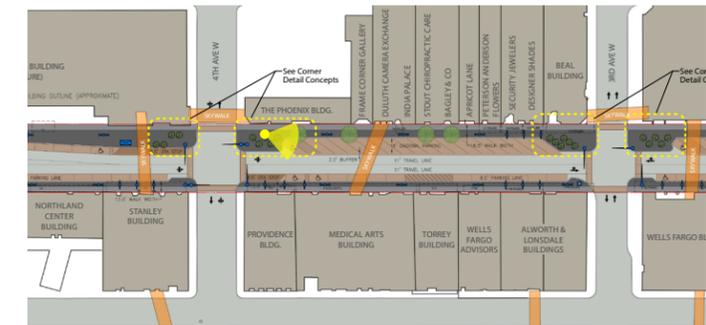


Figure 1.51 4th Avenue West on the north side of the street, looking east.

4th Avenue West: Winter Landscape

This view shows the bump-out at 4th Avenue West on the north side of the street in the winter. The snow has been plowed on the bump-out to allow for pedestrian movement, leaving at least one seating element occupiable. Tivoli lights in the trees brighten the winter landscape, and seasonal wreaths hang from the banner poles.

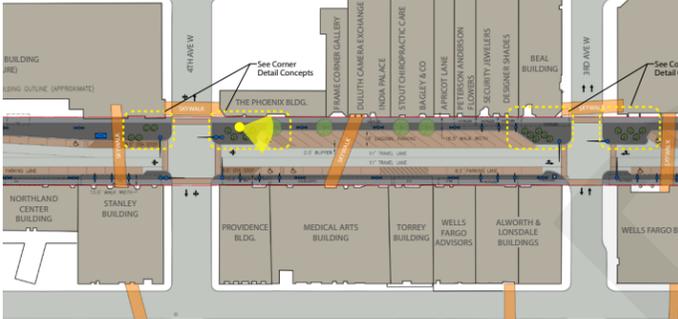
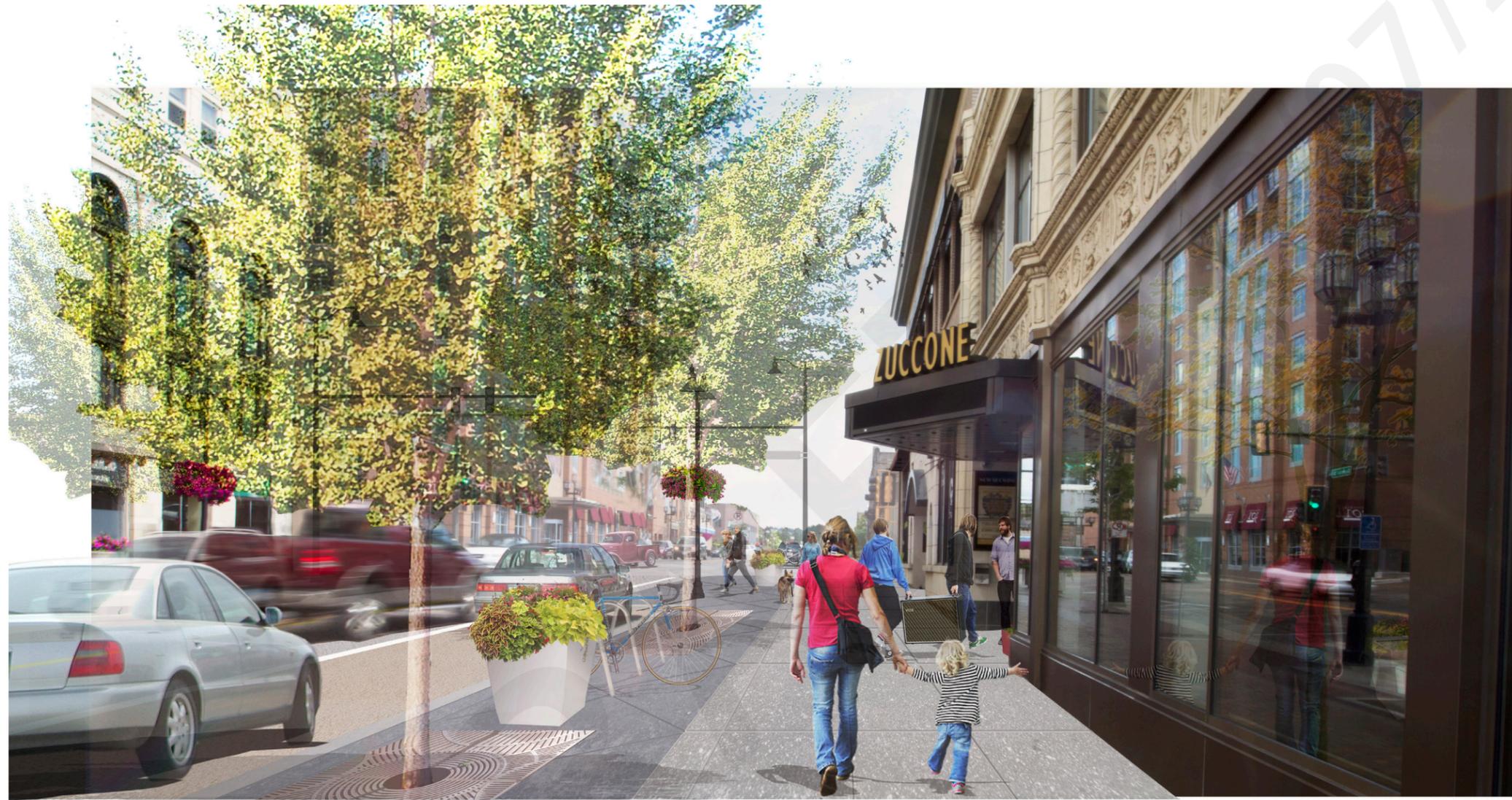


Figure 1.52 4th Avenue West on the north side of the street, looking east.



Streetscape Between 2nd and 3rd Avenues East

This view shows the mid-block condition between 2nd and 3rd Avenues East on the south side of Superior Street. Trees in grates, potted planters, and bike racks are some of the streetscape elements at this mid-block location. Hanging baskets bring seasonal color to the streetscape, and the paving pattern and color add visual interest and breaks up the pedestrian space.



Figure 1.53 Mid-block perspective view of the streetscape in west of 3rd Avenue East.

Bump-out at 1st Avenue East

This perspective view shows the bump-out at 1st Avenue East on the north side of the street. While not one of the larger bump-out areas, there is enough space for a cafe table or two and several potted planters to shape the space and add seasonal color. Trees, banner poles, and bike racks can also be seen at this location.



Figure 1.54 Perspective view of the bump-out at the corner of 1st Avenue East and Superior Street.

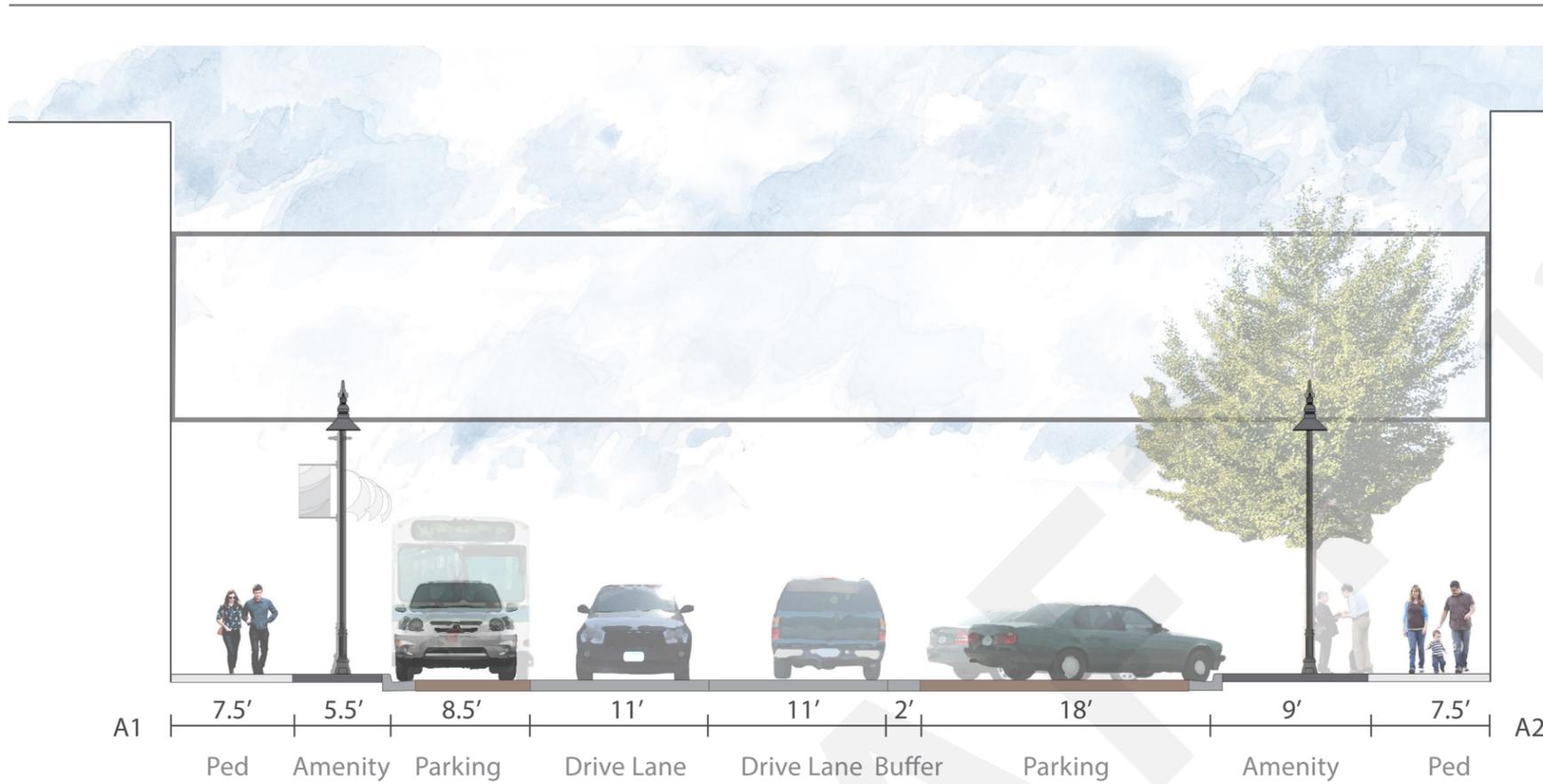


Figure 1.55 Streetscape Section A

LEGEND

- RIGHT OF WAY LINE
- PEDESTRIAN/SIDEWALK ZONE
- AMENITY ZONE
- PARKING
- TRANSIT LANE
- SIGNAL POLE W/ STREET LIGHT
- TRAFFIC SIGNAL (NO ARM)
- STREET LIGHT (DOUBLE LUMINAIRE)
- BANNER POLE
- TRANSIT SHELTER
- GATEWAY ELEMENT



Figure 1.56 Streetscape Section A, plan reference.

Section B

This section shows the streetscape between 1st Avenue West and Lake Avenue, looking west toward the intersection of 1st Avenue West and Superior Street. The pedestrian sidewalk and wide amenity bump-out on the north side of the street provides an opportunity for planting, gathering and lingering.

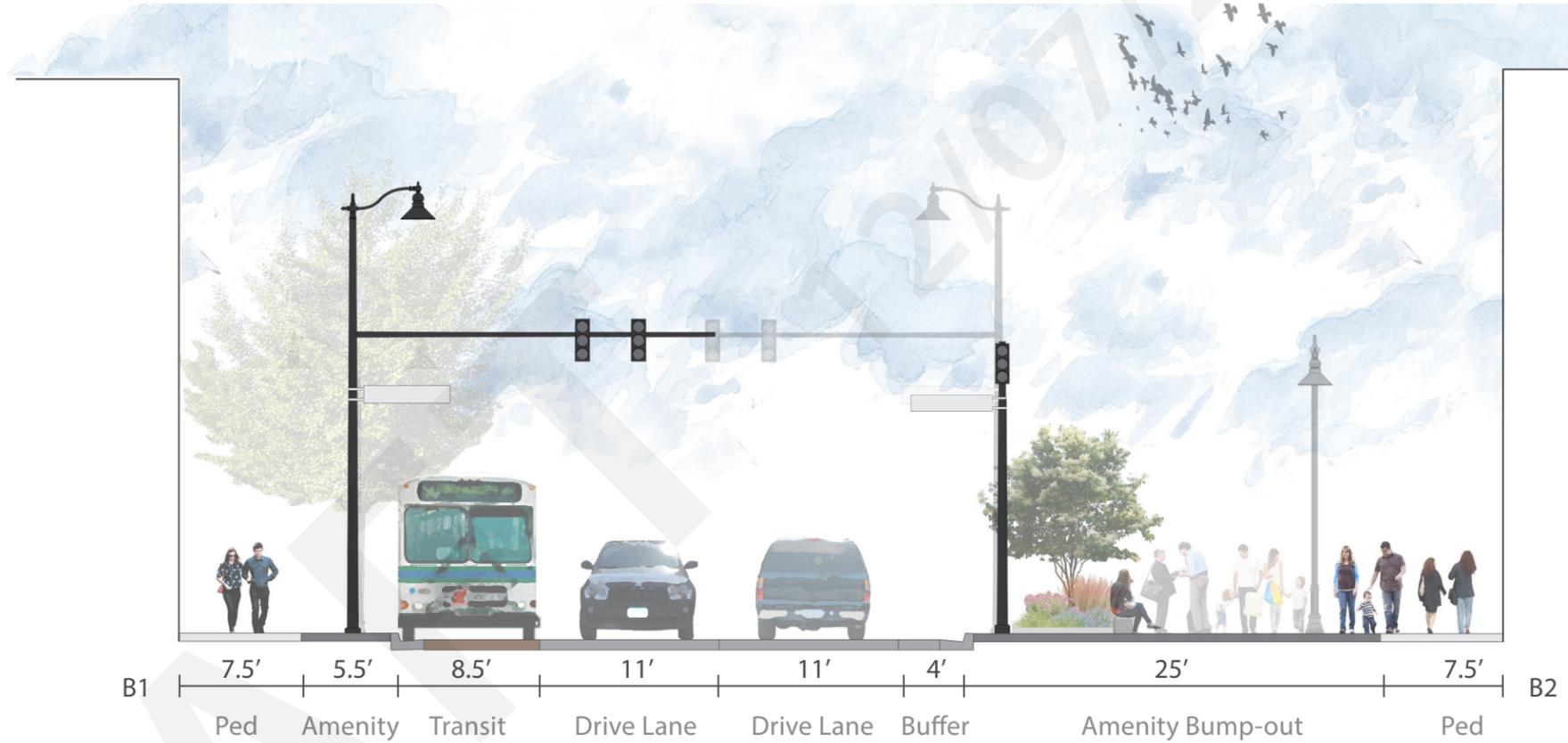
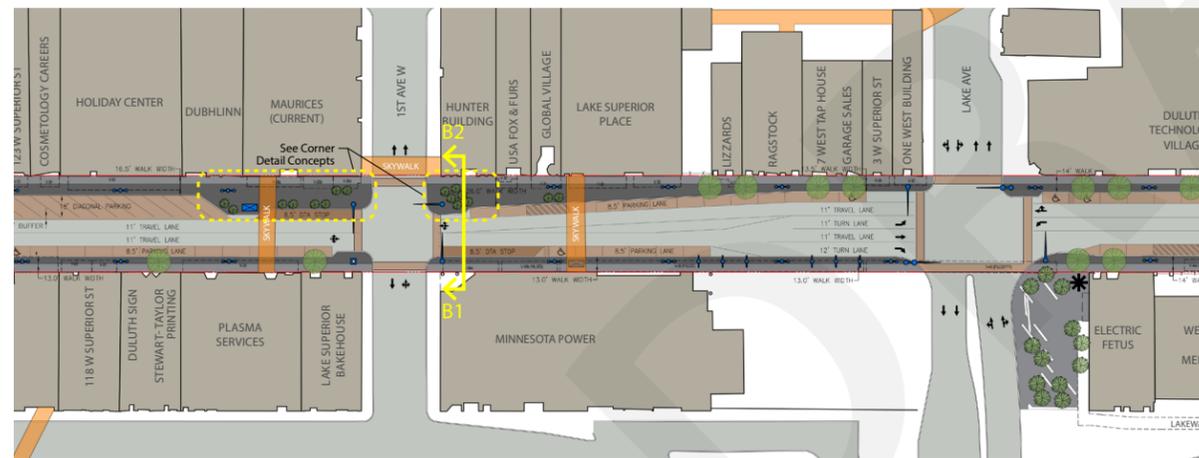


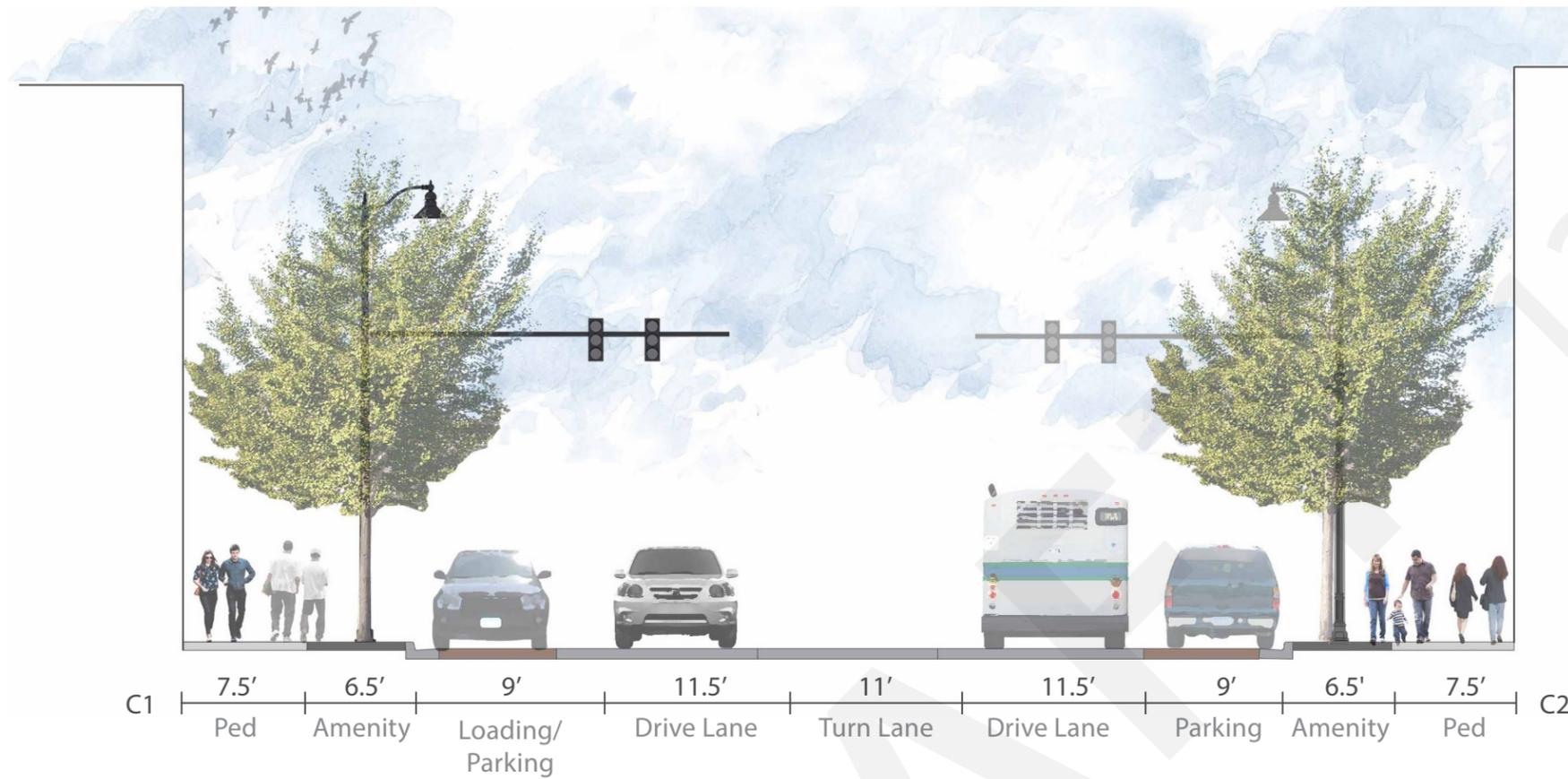
Figure 1.57 Streetscape Section B



LEGEND

- - - RIGHT OF WAY LINE
- PEDESTRIAN/SIDEWALK ZONE
- AMENITY ZONE
- PARKING
- TRANSIT LANE
- SIGNAL POLE W/ STREET LIGHT
- TRAFFIC SIGNAL (NO ARM)
- STREET LIGHT (DOUBLE LUMINAIRE)
- BANNER POLE
- TRANSIT SHELTER
- ✱ GATEWAY ELEMENT

Figure 1.58 Streetscape Section B, plan reference.



Section C

This section shows the streetscape condition between Lake Avenue and 1st Avenue East, looking west toward the intersection of Lake Avenue and Superior Street. There is parking on the north and south sides of the street, and a left turn lane.

Figure 1.60 Streetscape Section C

LEGEND

- - - RIGHT OF WAY LINE
- PEDESTRIAN/SIDEWALK ZONE
- AMENITY ZONE
- PARKING
- TRANSIT LANE
- SIGNAL POLE W/ STREET LIGHT
- TRAFFIC SIGNAL (NO ARM)
- STREET LIGHT (DOUBLE LUMINAIRE)
- BANNER POLE
- TRANSIT SHELTER
- ✱ GATEWAY ELEMENT

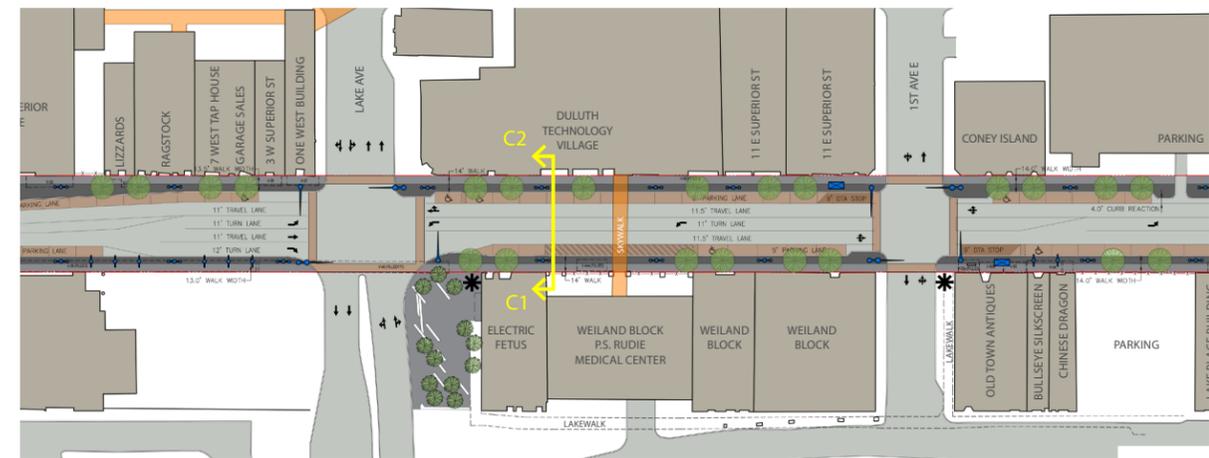


Figure 1.59 Streetscape Section C, plan reference.

Plaza

Introduction

There are two plazas located on either side of Superior Street's intersection with Lake Avenue that are among the only significant public spaces on Superior Street apart from the Ordean Plaza and Library areas at 5th Ave West.

The study includes the plaza on the east side of Lake Avenue owned by the City. This plaza currently includes benches, public art, and a fountain and provides a connection to the Lakewalk system. The design concept shown is one of several prepared for the plaza reconstruction. In this concept, the plaza is enhanced with a new paving pattern, planting scheme, and seating arrangement that leads people through the plaza, reinforcing the connection to the Lakewalk and alluding to Northern Minnesota geology. This concept is shown in Figure 1.61, and inspirational precedent imagery is shown in Figure 1.62. Final determination of the design, including the issue of retaining the fountain versus its removal, will be made during the detail design phase. Any work at this plaza will need to be mindful that the majority of the plaza is built over the roof of the Minnesota Power parking garage.

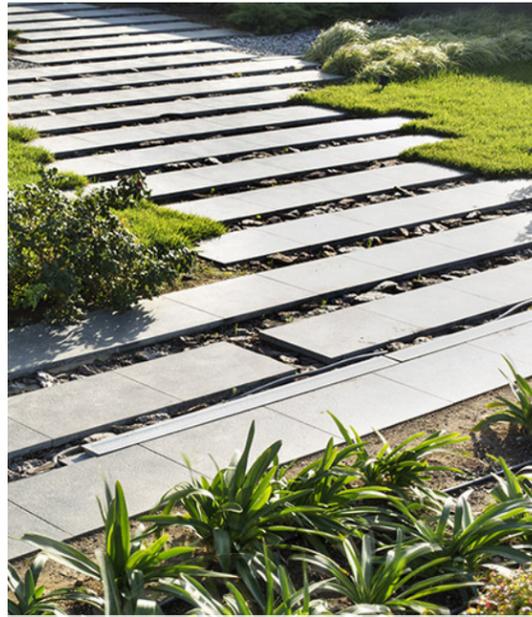
The study does not include work at the adjacent Minnesota Power plaza on the west side of Lake Avenue, portions of which are owned by Minnesota Power and is over their building parking garage. The plaza is available for public use by easement. The Minnesota Power (MP) plaza is the location of a seasonal farmer's market and other activities. As part of the study, the design team met with MP and discussed potential modifications to the space which included possible use of renewable energy features (solar panels) and a potential connection between the plaza and the sidewalk on Lake Avenue at the southeast corner of the plaza. Future coordination and discussion with Minnesota Power on the status of the plaza and potential modifications will be conducted independently of the project by the City.



Figure 1.61 Plaza concept plan.



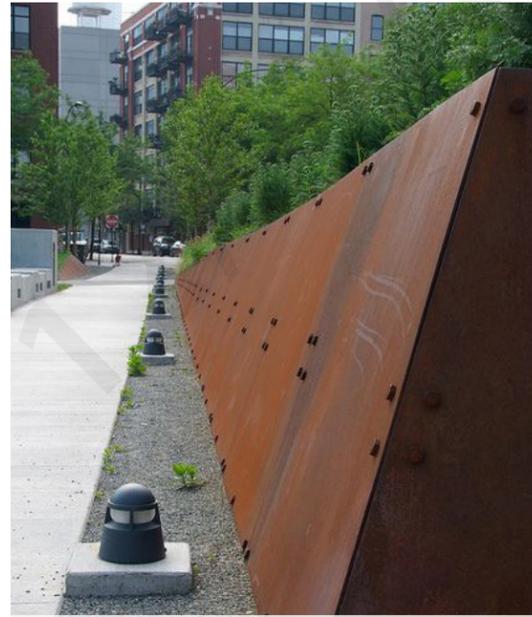
Paving Pattern



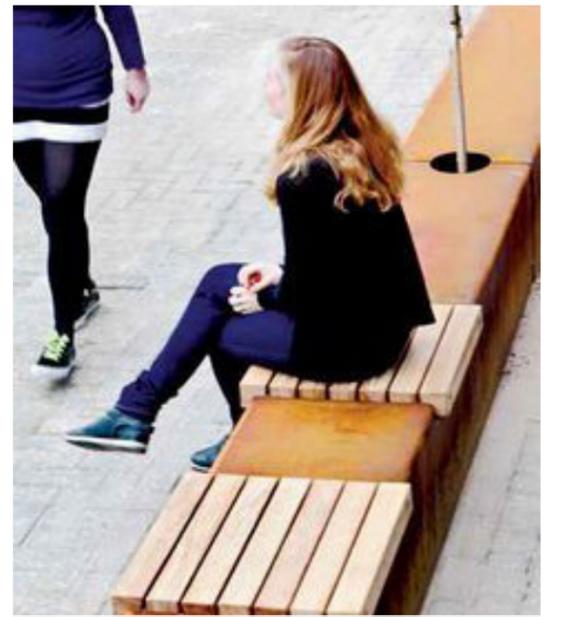
Paving Pattern



Walls



Walls



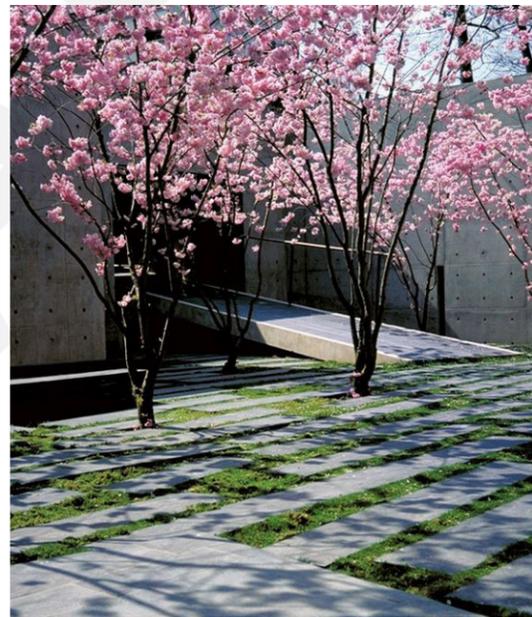
Bench



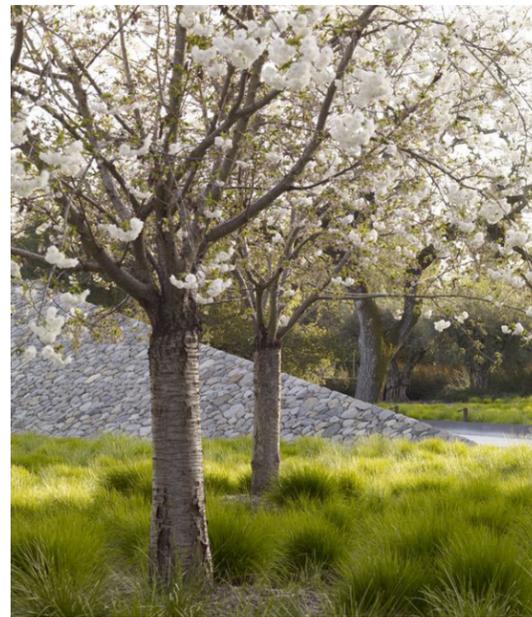
Bench



Woodland Grove



Grove and Paving Pattern



Grove and Planting



Planting

Figure 1.62 Plaza concept precedent images.

Traffic Analysis and Operations

» Existing Conditions
» Year 2017 and Year 2035 No Build Conditions

» Year 2017 and 2035 Build Conditions
» Key Findings and Recommendations

» Traffic Signal Warrants Analysis

Traffic Analysis and Operations

A traffic operations analysis was completed to determine the impacts on traffic associated with the Superior Street reconstruction project between 6th Avenue W and 4th Avenue E. As part of the reconstruction, turn lanes are proposed to be removed at several intersections along Superior Street. The objective of the traffic analysis was to evaluate the existing conditions along Superior Street, develop future traffic forecasts, evaluate operations along the corridor without the reconstruction, evaluate operations along the corridor with the reconstruction, and recommend potential geometric and/or traffic control modifications.

Twelve intersections along Superior Street were included in the analysis. All intersections were analyzed using a combination of Synchro/SimTraffic software and the Highway Capacity Manual (HCM). Operations analysis results identify a Level of Service (LOS) which indicates how well an intersection is operating based on the average delay per vehicle. In general, overall intersection LOS A through D is considered acceptable.

For purposes of evaluating future year conditions, two future year forecasts were developed; one for the year of opening (assumed 2017) and the other for the 20 year forecast year (2035). For comparative purposes, daily traffic volumes for year 2007 and for forecast year 2035 were provided by the Duluth-Superior Metropolitan Interstate Council forecasts were reviewed to determine an annual growth rate along Superior Street. Based on this review, a one-half percent annual growth rate was identified and this growth rate was applied to the existing a.m. and p.m. peak hour turning movement volumes to develop future year forecasts.

Existing Conditions

The results of the existing conditions operations analysis indicate that all of the study intersections operate at an acceptable overall LOS C or better during the a.m. and p.m. peak hours with the existing traffic control and geometric layout. Although the study intersections operate at an acceptable overall level of service, westbound 95th percentile queues of approximately 400 feet were observed in the traffic simulation model and verified in the field at the Superior Street/Lake Avenue intersection during the p.m. peak hour. This queue is the result of the limited westbound Superior Street to

Lake Avenue left-turn lane storage (100 feet) and high left-turning volume. These queues also extend into the westbound through lane, resulting in additional impacts. No other significant delay or queuing issues were identified at the remaining study intersections.

Year 2017 and Year 2035 No Build Conditions

To establish a baseline for comparisons to the build conditions, a detailed traffic operations analysis was completed with the existing roadway network under year 2017 and year 2035 traffic forecasts. The results of the year 2017 and year 2035 no build operations analysis indicate that all of the study intersections are expected to operate at an acceptable LOS D or better during the a.m. and p.m. peak hours with the existing traffic control and geometric layout. The westbound queuing issue identified under existing p.m. peak hour conditions at the Superior Street/Lake Avenue intersection is expected to continue under year 2017 and year 2035 conditions, with the left-turn queue ultimately spilling back into the through lane in the p.m. peak hour of year 2035 affecting the operations of the Superior Street/1st Avenue E intersection by preventing vehicles from departing this intersection. No other significant delays or queuing issues are expected.

Year 2017 and 2035 Build Conditions

A build traffic operations analysis was completed for year 2017 and year 2035 to evaluate the impacts that reconstructing the roadway and changing the geometry at various intersections will have on traffic operations. The results of the year 2017 and year 2035 build operations analysis indicate that all of the study intersections are expected to operate at an acceptable LOS C or better during the a.m. and p.m. peak hours. The traffic operations do not degrade significantly or to unacceptable levels of service compared to the no build conditions. As part of the reconstruction project, it is recommended to extend the westbound left-turn lane the entire length of the block at the Superior Street/Lake Avenue intersection. This will reduce the frequency of the queue spilling back into the through lane, and it will improve the overall operations of the intersection from LOS D in the no build to LOS C in the build scenario during the p.m. peak. This mitigation will also improve traffic operations at the Superior Street/1st Avenue E intersection from LOS D in the no build to LOS B in the build scenario during the p.m. peak.

The removal of turn lanes at several intersections along Superior Street does not significantly impact traffic operations.

Key Findings & Recommendations

The results of the traffic operations analysis indicate that all study intersections currently operate at an acceptable overall LOS C or better during the a.m. and p.m. peak hours with the existing traffic controls and geometric layout. The only operational issue is the westbound left-turn at the Superior Street/Lake Avenue intersection during the p.m. peak hour. In year 2035 the westbound queue is expected to extend approximately 500 feet and spill-back into the through lane, which will impact both the Superior Street/Lake Avenue and Superior Street/1st Avenue E intersection.

The results of the build traffic operations analysis indicate that Superior Street can be reconstructed to create a more multi-modal roadway, while maintaining efficient traffic operations for vehicles. The removal of turn lanes at the various intersections does not significantly degrade traffic operations along the corridor. As part of the reconstruction, it is recommended to extend the westbound left-turn lane the entire length of the block at the Superior Street/Lake Avenue intersection to reduce the likelihood of the westbound left-turning queue impeding through and right-turning vehicles. With this improvement, the traffic operations are more efficient in the build conditions than the no build conditions.

Traffic Signal Warrants Analysis

A traffic signals warrant analysis was completed for Superior Street from 6th Avenue West to 4th Avenue East. The objective of the analysis was to provide recommendations for intersection traffic control associated with the Superior Street reconstruction project. As part of the analysis, vehicular and pedestrian volumes were collected, along with field observations of the roadway characteristics (e.g. roadway geometry, posted speed limits, on-street parking types and locations, sight lines, locations of transit stops, etc.). Ten existing signalized intersections and two side-street stop controlled intersections were included in the analysis.

Of the intersections analyzed, only the Superior Street/Lake Avenue intersection meets volume-based signal warrants. However, while volume-based warrants are not met at the other signalized

intersections, it is recommended that these intersections remain signalized with the reconstruction. The recommendation to keep the intersections signalized is based on various factors, such as sight line constraints at the intersections, creating a relatively safe environment for all transportation modes, and the traffic operations analysis indicates they provide a high level of service. It is also recommended that the two side-street stop controlled intersections, Superior Street East/Michigan Street and Superior Street East/4th Avenue East, remain side-street stop control with the reconstruction.

Refer to the attached "Traffic Signals Warrant Analysis: Superior Street from 6th Avenue West to 4th Avenue East" memorandum for more detailed signal warrant details.



Figure 1.63 Lake Avenue and Superior Street intersection.

Street

- » General
- » On-street Parking, Loading Zones and Transit Stops
- » Parking Management

- » Signals, Signing, and Intersection Lighting
- » Transit Accommodations and Coordination

- » ADA Compliance
- » State Aid
- » Geometric Design Elements
- » In-Place Roadway

- » Proposed Typical Section
- » Typical Intersection Layout
- » Areaways/Vaults
- » Retaining Walls

General

Superior Street serves as a minor arterial in the heart of the downtown Central Hillside neighborhood connecting Lincoln Park and points west with the city's Congdon Park and Lakeside neighborhoods to the east. The intersecting avenues from 6th Avenue West to 4th Avenue East are major collectors running up to Mesaba Avenue and the Duluth Heights neighborhood to the north and down to Michigan Street one block to the south. Lake Avenue, also a minor arterial, intersects Superior Street and connects Superior Street with I-35, the Canal Park business district; the Duluth Entertainment and Convention Center (DECC) complex and the Park Point neighborhood.

Within the project limits, Superior Street's 2012 Average Daily Traffic (ADT) varies between approximately 10,000 and 14,500 vehicles per day (VPD) while Lake Avenue handles approximately 12,000 VPD. The other 2012 ADT volumes for the other intersecting avenues range between 1,900 and 5,000 VPD. Fifth Ave West, 4th Ave West and Lake Avenue are the major Heavy-commercial ADT (HCADT) data are not available but data recorded during the traffic study phase of the project suggest that HCADT likely varies between 400-500 VPD which is approximately similar to the HCADT for Mesaba Avenue on the west end of the corridor.

The overall project corridor length is approximately 5,110 lineal feet. Profile grades along the corridor are flat with a standard 2% roadway crown which is typically at the corridor center line except on certain blocks where it varies in location, offset slightly to the north of center line. Intersecting avenue grades typically vary between 9% and 14% and, in general, avenues are steeper between Superior Street and Michigan Street than between Superior Street and 1st Street. The project design speed is 30 mph.

Local traffic combines a wide array of multi-modal traffic groups including pedestrians, vehicles, transit and cyclists. Daily commuters rely on Superior Street to access their workplaces at any of the wide variety of business and commercial offices; retail businesses; government offices; entertainment and hotels along or accessed by the corridor. The corridor is also home to an array of residential apartment complexes and entertainment venues including restaurants; eateries; bars; theaters; and nightclubs. Larger truck and heavy vehicle traffic also use Superior Street to load and unload food, goods and supplies to the fronting businesses. Occasional heavy vehicle through traffic is also seen on Superior Street.

Superior Street On-Street Parking											
BLOCK	EXISTING					PROPOSED DISTRICT CONCEPT					△
	NORTH SIDE					NORTH SIDE					
	Standard	Accessible	Loading	Transit	Total	Standard	Accessible	Loading	Transit	Total	
1	7	1	0	1	8	6	1	0	1	7	-1
2	7	1	0	1	8	5	1	0	1	6	-2
3	22	0	0	0	22	18	1	0	0	19	-3
4	10	2	0	1	11	14	1	0	1	15	4
5	14	2	1	1	15	13	1	1	1	14	-1
6	14	0	1	0	14	12	1	1	0	13	-1
7	6	2	0	1	8	12	2	0	1	14	6
8	11	0	1	1	11	9	1	0	1	10	-1
9	11	1	1	0	12	9	1	2	0	10	-2
10	6	0	1	0	6	4	1	1	0	5	-1
Total	108	7	5	6	115	102	11	5	6	113	-2

BLOCK	EXISTING					PROPOSED DISTRICT CONCEPT					△
	SOUTH SIDE					SOUTH SIDE					
	Standard	Accessible	Loading	Transit	Total	Standard	Accessible	Loading	Transit	Total	
1	6	2	0	1	8	7	2	0	1	9	1
2	8	1	1	1	9	8	1	1	1	9	0
3	7	2	2	1	9	10	2	2	1	12	3
4	13	1	0	1	14	15	1	0	0	16	2
5	10	0	1	1	10	11	1	0	1	12	2
6	5	1	0	1	6	5	1	0	1	6	0
7	6	1	2	0	7	6	1	1	0	7	0
8	10	1	2	1	11	12	1	1	1	13	2
9	14	1	0	0	15	12	1	1	0	13	-2
10	11	0	1	0	11	13	1	1	0	14	3
Sub-Total	90	10	9	7	100	99	12	7	6	111	11
TOTAL	198	17	14	13	215	201	23	12	12	224	9

NOTE: △= Proposed-Existing (+ =Gain, - =Loss)

Figure 1.64 Superior Street On-Street Parking table.

Blocks	
1	6th Ave W to 5th Ave W
2	5th Ave W to 4th Ave W
3	4th Ave W to 3rd Ave W
4	3rd Ave W to 2nd Ave W
5	2nd Ave W to 1st Ave W
6	1st Ave W to Lake Ave
7	Lake Ave to 1st Ave E
8	1st Ave E to 2nd Ave E
9	2nd Ave E to 3rd Ave E
10	3rd Ave E to 4th Ave E

Including logging trucks, which can be weight restricted from the Federal Interstate. Bicyclists use Superior Street to commute to work and access local businesses as well as a connector between existing designated cycling accommodations to the east via London Road and the Lakewalk and to the west via the Cross City Trail.

The available right-of-way is 80 feet the limits of which generally correspond with the building face on any given block. The project is proposed to occur entirely within City of Duluth right-of-way; however, connections to MnDOT right-of-way at Lake Avenue and at the west limit of the project are required and will require coordination with MnDOT. The proposed street layout must balance the diverse types and interests of users within a relatively space constrained right-of-way.

On-street Parking, Loading Zones and Transit Stops

Curb side space on Superior Street is utilized for on-street parking (standard and ADA accessible), loading zones, and transit stops. The availability of on-street parking was identified as a significant priority for many downtown businesses with consistent input that direct and easy access to storefronts was essential to attract shoppers to the downtown area and is a must-have for drop-off/pick-up traffic. Feedback also emphasized that on street parking is particularly vital during Duluth’s inclement winter months and that, similarly, plowing and snow-removal are identified as maintenance priorities to ensure access.

A number of on-street parking alternatives were considered in the preliminary design including the partial or complete loss of on-street parking to provide more pedestrian and amenity space, provide traffic calming or for utilization to other on-street purposes such as bike lanes or cycle tracks. The availability of ramp parking in the downtown area was also discussed and to the extent that off-street ramp parking might mitigate the loss of on-street parking. Many business owners voiced strong opposition to the loss of on-street parking, citing their own unsuccessful attempts to incentivize the use of ramp parking by their customers including ramp parking validation and discounts and consistent customer feedback emphasizing the need for on-street parking. During the public involvement process, design alternatives that perpetuated on-street parking on both block faces were preferred over alternatives that diminished on-street parking totals.

The proposed streetscape layout utilizes both parallel and diagonal parking. Parallel parking and diagonal parking dimensions are shown on the street layout. The diagonal parking configuration consists of 35 degree angled parking which matches the in-place condition. A State-Aid variance for design elements related to diagonal parking will be required. Refer to that the Street Layout section of the document for further discussion. Alternatives to standard parking configurations, including the use of reverse-angle parking on Superior Street and the adjoining avenues were considered but were ruled out due to its relative unfamiliarity with users, its lack of current use in Duluth and limited implementation statewide in Minnesota.

Loading Zones and No-Parking Areas

In general, loading zones are shown in their present location; however, efforts were made during the preliminary design phase to confirm the utility of any given loading zone and make modifications where it was determined appropriate to do so. Three existing loading zones were eliminated and converted to on-street parking. These are:

1. The loading zone located near the southwest corner of 3rd Ave West and Superior Street. Located approximate front of the Alworth building.
2. The loading zone located near the mid-block between 2nd Ave West and 1st Ave West. Located approximately in front of the Sawmill furniture store.
3. The loading zone located near the northeast corner of 1st Ave East and Superior Street. Located approximately in front of the Coney Island restaurant.

After discussion with the Duluth Police Department, the existing police parking spot located on the south side of Superior Street between Lake Ave and 1st Ave East was eliminated. Based on meetings with the City of Duluth Fire Marshall, the fire lane / patient drop off spot in front of PS Rudie must remain along the entire face of the building to meet fire code requirements. A substantial loading/unloading zone at the Sheraton is to remain.

The existing “no-parking” zone in front of the Lakewalk access at the mid-block between 2nd Ave East and 3rd Ave East must be preserved as it provides access for emergency vehicles to the Lakewalk.

The need for loading/unloading on Superior Street is a given. It is noted that many DTA stops on Superior Street are currently signed as dual loading zones. The City will determine if this is to be perpetuated as part of the final design but, in general, one loading zone per block on each side is considered desirable. Moving forward, the City may convert on-street parking to loading zones based on requests from adjoining businesses or building owners.

Parking Management

The City is actively pursuing new metering, enforcement practices, fees, payment options, and other strategies to improve the use and function of on-street parking in the greater downtown area and early, trial implementation of pay stations (DPT Luke II systems) is underway in certain areas. New metering/pay station implementation on a corridor wide basis, if adopted, is anticipated to consist of 1 to 3 pay stations on each side of the block. New regulatory parking and advisory signage will be required. The location, communication and power needs of the new systems and ongoing coordination with City of Duluth parking services will be required in the final design phase for implementation. New wayfinding, increased visibility and the possible use of digital ramp signage is also being considered by the City to improve off-street ramp parking usage.

Signals, Signing, Striping and Intersection Lighting

Consistent with the traffic analysis, traffic signals will remain at all existing locations. Street reconstruction will require the traffic signals to be upgraded to current State Aid requirements, although portions of the existing systems may be salvaged if they are so identified in the final design. Each individual intersection will be evaluated to determine the exact design requirements in coordination with the revised roadway geometry, lane widths, pedestrian crossings and turning movements. During the detail design process, existing traffic signal equipment will be reviewed to determine components that can be reused versus those elements to be updated and replaced.

Intersection lighting will occur on diagonal corners to the approaching traffic. Lighting will occur on top of the respective traffic signals with davets. Lighting will conform to the lighting specification for the Superior Street corridor including use of the same luminaire, LED source and dark sky compliance.

Street signing and other traffic control items found within and parallel to the street should be located when possible within the element

Transit Shelter Locations	
EAST BOUND STOPS	
Shelter	6th Ave W (Library)
Shelter	5th Ave W (Ordean) - shelter moving west toward plaza
Shelter	1st Ave W (Minnesota Power) - shelter under skywalk
Shelter	1st Ave E
WEST BOUND STOPS	
Shelter	5th Ave W (Radisson)
Shelter	4th Ave W (new Maurices)
Shelter	Holiday Center
Shelter	1st Ave W (former Maurices)
Shelter	1st Ave E (Tech Center)

Figure 1.65 Transit shelter locations.



Figure 1.66 Digital parking meters, existing transit shelter, a Duluth city bus and existing diagonal parking are shown in the above images.

line for vertical components. Placement along the element line will assist in organizing the streetscape space, providing a protective distance from vehicle overhang or door swing, and provide snow removal space.

Although designated bike lanes are not provided in the proposed design, use of Superior Street for bike traffic is expected to continue as it does today subject to the applicable provisions of Minnesota State Law for bicycles operating on streets. To enhance safety, the City may consider the implementation of signage that reinforces the multi-use nature of the street such as the use of “Share the Road” signs. The effectiveness of such signs is a matter of debate and dialogue with the biking community and general community outreach and education is warranted to ensure such measures produce the desired effect, if they are to be considered. The use of striping including bike sharrows, can improve safety by placement that suggests where bicyclists should ride and by notifying motorists of a bike presence on the street. The use of sharrows in Duluth is relatively limited and it would be recommended that the City study and develop a policy determines their suitability for use on Superior Street and/or on other local streets to ensure that their implementation is effective and consistent throughout the City and, if adopted, accompanied with general community outreach and education.

Given the constraints of the right-of-way, the presence of diagonal parking, and the mixture of traffic, the typical cyclist using Superior Street is likely to be a high level user with strong bike skills and relatively little fear of cycling in traffic and for whom the presence of advisory signage or sharrows is less likely to inform their decisions with regard to biking on Superior Street, if at all. Their use in the current design is not proposed and if such measures were to be implemented in the future, the City should consider that the use of signage and particularly the use of sharrows may suggest a level of accommodation on the Street that is not intended or available under the circumstances.

Transit Accommodations and Coordination

The Duluth Transit Authority’s (DTA) primary hub for downtown transit routes currently operates on Superior Street via the Holiday Center and Transit Center for westbound and eastbound routes respectively on the block between 3rd Avenue West and 2nd Avenue West. The DTA’s Multi-Modal Transit Terminal is currently under construction and will transfer the primary downtown transit boarding and transfer activity to Michigan Street between 3rd Avenue West and 2nd Avenue West. Westbound transit traffic will enter and exit the downtown via Superior Street utilizing 3rd Avenue West to access the new Multi-Modal Transit Terminal. Eastbound traffic will enter and exit downtown via Superior Street utilizing 3rd Avenue West to enter the terminal and using 4th Ave

West to leave the terminal. As a result, the existing transit stop at the Holiday Center on the north side of Superior Street will be utilized for drop off only (pick-up for ADA users only) and the stop at the existing Transit Center on the south side of Superior Street will be eliminated. Third Avenue West and 2nd Avenue West will be converted from their present one-way configuration to two-way traffic and a new signal will be provided at the intersection of 3rd Avenue West and Michigan Street.

Transit coordination during the preliminary design phase involved confirming the need for transit stops and shelters on each individual block. The DTA currently operates thirteen stops on Superior Street within the project limits. The proposed design reflects the elimination of the stop at the current Transit Center. In addition, the DTA currently operates 8 transit shelters on Superior Street, listed in Figure 1.65.

Transit shelters currently in place will be reused. Required maintenance and improvements, such as electrical feeds and technology, should be considered at the time of construction. There are currently 2 stops located at the Holiday Center. To reflect the change in transit usage at this location, one of the existing shelters will be eliminated with one shelter remaining to accommodate disabled transit users who will continue to use this location for boarding as well as the seasonal DTA trolley route which will continue to board at the Holiday Center. The DTA intends to

add one shelter to the corridor (DTA provided) on the south side of Superior Street between 1st Ave East and 2nd Ave East. Transit shelters require power for lighting and electrical heaters.

Transit stops are configured as far-side stops to allow vehicles to align with the stop through the intersection. Transit stops at mid-blocks are not desirable due to the maneuvering required by the buses to access the stop and the likelihood that buses using such stops would slow or stop traffic with the rear of the vehicle in the traffic lane.

During the construction phase, the DTA will implement alternate routes around the construction zone. ADA accessibility through the construction zone is a concern. DTA may be able to address those concerns using their STRIDE vehicles but consideration needs to be given to ADA users and access during construction particularly as it relates to ensuring access to the new DTA Multi-Modal Terminal on Michigan Street.

ADA Compliance

All elements of the design are expected to be fully Public Right-of-Way Accessibility Guidelines (PROWAG) compliant unless it is demonstrated that it is not feasible to do so. Detailed intersection layouts will be provided as part of the final design. Temporary Pedestrian Access Routes (TPAR) layouts will be required to ensure

ADA accessibility to the maximum extent feasible through the construction phase.

State Aid

Superior Street is part of the City’s Municipal State Aid Street system and is required to meet the Department of Transportation Local State-Aid Route Standards as provided in State-Aid Operations Chapter 8820 of the Minnesota Administrative Rules. Where State Aid Rules are not achieved, a variance must be obtained from the office of State Aid through the Variance Committee.

Geometric Design Elements

As part of the 1985 project, variances were obtained for driving lane width, turn lane width, parking lane width, and curb reaction.

The existing and proposed 35-degree parking configuration will require a variance as part of the final design summarized in Figure 1.67

Geometric Design Elements				
DESIGN ELEMENTS	EXISTING CONDITION	PROPOSED LAYOUT	REQUIRED	STANDARD/REMARKS
Roadway Type	Urban			
Project Type	Reconstruction			
Functional Class	Minor Arterial			
ADT (Year)	>10,000 (varies by block)			
Heavy Commercial, %	Unknown			
Speed, mph	Design Speed (30 mph)			
Driving Lane Width, ft	Varies (11-12)	Varies (11-11.5)	11	State Aid Rules (SA) 8820.9936: 11 min (12 preferred) *Existing variance for 11 foot driving lanes
Turn Lane Width, ft	10-11	11	10	MnDOT Road Design Manual 4-3.01.02: 10 min (12 preferred) *Existing variance for 10 foot left turn lanes
Right-of-Way, Width, ft	80			
Median, ft, Raised/Planted	n/a	n/a	4	
Median Curb Reaction, ft	n/a	n/a	1	
Diagonal Parking, Y/N	Y	Y		
Parking Angle, °	35	35	45/60	SA 8820.9961 (variance required)
	9	9	9	SA 8820.9961
Parking Stall Depth, ft	18	18	20/21	SA 8820.9961 (variance required)
Distance Between Traffic Lane and Parking Stall, ft	2	2	14/19	SA 8822-.9961 (variance required)
Length Along Curb, ft	15	15.7	12.7/10.4	SA 8822.9961
Curb and Gutter type	B	B		
Curb Reaction, ft	n/a	n/a	4	SA 8820.9936: must be provided only where parking is not provided.* Existing variance for 0 foot reaction at curbs.
Parallel Parking Land Width, ft	8 + 4 (buffer)	Varies (8.5-9)	10	
Parallel Parking Lane Length, ft	22	Varies (22-28)		
Sidewalk Width, ft	Varies (6 min)	Varies (13 min)	8	ITE Design and Safety of Pedestrian Facilities: 8 (min)

*Existing variance to state aid rules SSA 8820.9912 (Dated March 26, 1984), granted by the Commissioner of Transportation on January 16, 1985.

Indicates Variance Required

Figure 1.67 Geometric Design Elements table.

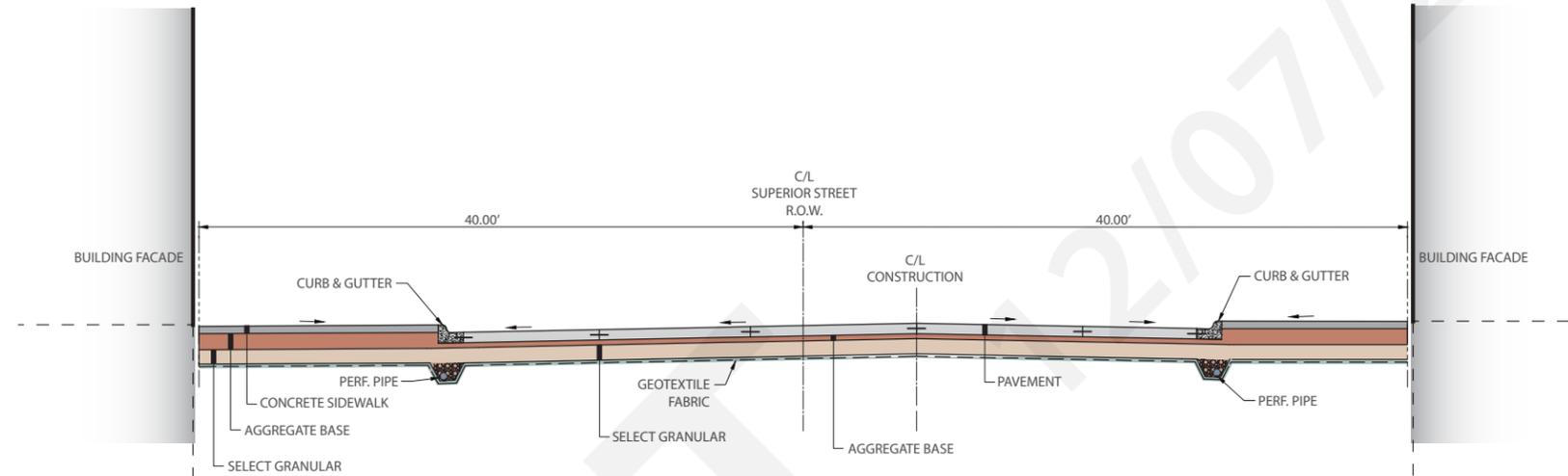


Figure 1.68 Representative typical section.

In-Place Roadway

The in-place road section on Superior Street was constructed in the mid-1980s and consists, in general, of 2 ¼" brick pavers on a ¾" asphalt setting bed underlain by 9-inches of concrete and compacted aggregate base. Remnant tracks and structure (ties and concrete) from the old Duluth Trolley system run down each side of Superior Street's center line. In 2013, on some blocks of Superior Street, the existing bricks within the drive lanes were removed and replaced with bituminous surfacing. The existing walks consist of the same brick and asphalt setting bed structure over 4" of concrete base and compacted aggregate base.

Proposed Typical Section

The proposed typical cross section consists of 8-inches of concrete over 4-inches of aggregate base and 24-inches of select granular base and geotextile separator fabric. In general, concrete surfacing will be non-reinforced with dowelled transverse and tied longitudinal joints. Curb will be tied. Keyways will not be used. Joints will be sealed. Pavement reinforcing will be considered at odd-shaped panels, surfacing penetrations, or where unique subsurface or utility trench conditions warrant. High early concrete should be considered at key intersections and project segments to facilitate sequencing and re-opening to traffic. The use of integral concrete coloring and/or staining and other architectural surface treatments is discussed under the streetscape portion of the document.

Curb face will be MnDOT design B to facilitate the delineation of the roadway edge, drainage, and snow plowing operations. Proposed walks will be 6-inches thick, non-reinforced over aggregate base and select granular base. Roadway edge drains are to be provided and sub-grade graded to the inlet from building face and roadway center line.

Refer to the typical section and project geotechnical report for additional information.

Typical Intersection Layout, Cross Walk Treatment and Considerations

Pedestrian crossings at Avenues are sited in line with the pedestrian thoroughfare along the building face to provide the most direct connection block to block and in line with the anticipated pedestrian traffic route. Each intersection will need to be evaluated for ADA grades and cross-walk treatments. In certain cases, intersecting profile grades and traffic/signal considerations may require the adjustment of the crossings to better suit the individual needs at each location.

The use of a mid-block crossings was discussed during the pre-design and public involvement phase. In general, the use of mid-block crossings is suggested where there is a significant pedestrian desire to cross the street in the absence of a protected crossing. A mid-block crossing was suggested at the mid-block between 3rd

Avenue West and 2nd Ave West where there is currently regular pedestrian traffic between the main entry of the Holiday Center on the north side of the street and the DTA transit center on the south side of the street. The long term desire and demand for pedestrians to continue to use this area as an informal crossing in light of the impending relocation of transit boarding activities to Michigan Street at the new DTA Multi-Modal Transit Terminal is not clear. A similar condition exists between 2nd Ave East and 3rd Ave East at the mid-block entry to the Lakewalk. The demand here is less clear and the opposite side street destination is not apparent with the ongoing closure of the NorShor Theatre. A traffic study to determine the actual long term demand in these locations may be considered once the new transit terminal or theater are open and regular pedestrian traffic patterns are established. If the long term demand at these locations is shown to exceed 25 pedestrians per hours for at least four hours of a typical day, mid-block crossings may be further considered for implementation. The average distance between designated cross walks at the signalized intersection on Superior Street is about 400-ft and so their use is just at the margin of distance where it would be considered warranted. The implementation of a mid-block should incorporate curb extensions at the pedestrian crossing location and will also diminish on-street parking by the construction and, in addition, on-street parking may be further impacted to ensure minimum sight lines to ensure an effective crossing. Parking impacts should be discussed with adjacent building owners and businesses. In view of the unclear

demand, relatively short block length on Superior Street between designated crossings, and the effects to on-street parking, mid-block crossings were not adopted in the proposed street layout.

Areaways/Vaults

Numerous buildings fronting Superior Street have areaways/ vaults which project across the Superior Street right-of-way beneath the sidewalks. The vaults in most cases extend the buildings basement level by allowing it to project out towards Superior Street beneath the existing sidewalk. Construction type for the vaults varies with many having bluestone or concrete foundation walls and roofs consisting typically of concrete with or without supporting steel elements. The purpose for the vaults varies by building with the vaults, in many cases, as an areaway from which utilities are brought into the building. Historically many of the vaults served as an access way for coal to be fed into the building from the fronting street thus resulting in the vault serving little purpose currently. Review of construction drawings from the last Superior Street reconstruction project indicates that many of the existing vault roofs were reconstructed at that time and in some cases vaults were entirely abandoned by barricading their penetrations into the buildings and filling them with lean fill concrete or other materials. The vault reconstruction work typically consisted of replacement of the concrete roof features, repairs to walls and some type of



Figure 1.69 Inside the vaults on Superior Street, and existing retaining walls at Gateway Tower.

waterproofing than placed over the roof prior to completion of sidewalk brick pavers and other surface elements.

In moving forward with the Superior Street reconstruction project, several work items will be necessary with regards to the existing vaults:

- Any vaults which can be accessed from the building interiors should be reviewed by a structural engineer. The purpose of the review is to ascertain and document the condition of the vault walls and roof structure so provisions can be incorporated into the project for any repairs which may be warranted at the time the surfacing above is removed.
- At any locations where vaults are present and it is anticipated sidewalk surface grade will be lowered or new foundations will need to be constructed (such as for light poles), the vault geometry should be further assessed for coordination of activities. In particular, at some locations, there is limited clearance from top of vault roof to top of existing sidewalk, so this dimension should be tracked for conflict avoidance.
- Opportunity for filling/ abandoning of any vaults should be assessed. Due the legacy costs of vault maintenance, the up front cost of barricading any openings where the vaults penetrate the buildings, waterproofing the building face and filling them with lean concrete is highly advantageous.

- Appropriate repairs as warranted by existing condition should be made to the vaults to ensure their condition will support the reconstructed roadway/ sidewalks for the anticipated project life expectancy. In many cases the repair needs will be able to be ascertained from the vault condition assessment. It is, however, also advised that contingency be incorporated for unanticipated vault roof and upper foundation wall repair needs which are likely to be uncovered when the excavation work for the project occurs and exposes regions of the vault which are otherwise not visible for assessment.
- To further protect the existing vault roofs from moisture and deicing salt intrusion, it is recommended that any existing or repaired vault roof surfaces be waterproofed prior to placement of topping/ surface materials.

Retaining Walls

With buildings fronting the majority of the Superior Street right-of-way on both sides there are limited locations where exposed retaining walls are present. Two locations with exposed retaining walls have been identified.

The first of these locations is on the West end of the project, along the north side at the Gateway Towers property. At this location an approximately 300 foot long concrete retaining wall of varying height (10' to 15') retains the Superior Street roadway and sidewalk

grade above the recessed Gateway Tower property. The condition of this concrete retaining wall is varied with regions exhibiting large spalls and areas of delaminations. In addition, the Superior Street sidewalk along portions of the wall is comprised of a cantilevered slab which extends from the retaining wall face. The underside of this cantilevered slab is also experiencing significant quantities of spalls and delaminations. This retaining wall will need either substantial repair work or potentially replacement in order to bring it to a condition state which will adequately support the Superior Street loadings and meet the design life intent for the project. Final design work for the project will need to include a comprehensive investigation of the wall's condition and a cost benefit assessment for repair versus replacement. Existing construction drawings for the walls design are also being searched for. At this time it has been verified the wall existed prior to the construction of the Gateway Towers building and may have been constructed as part of a former development on the site or in association with the adjacent rail yard which existed at the time. To ensure the project cost estimate accounts for the needs of this retaining wall, costs for rehabilitation of some portions of the wall and full replacement of the most deteriorated segments has been included.

The second retaining wall location is along the east end of the project between 1st and 2nd Avenues East at the former Muffler Clinic property location. At this location there is a 100' long cantilevered concrete and stone masonry retaining wall approximately 15 feet

tall supporting the south side Superior Street sidewalk above a parking lot which is accessed from Michigan Street. This retaining wall was the north basement wall of the former Muffler Clinic building/ parking deck prior to its demolition several years ago. The vertical stem of the retaining wall lies to the south side of the superior Street right-of-way and is thus on private property. There is concern that the wall may not be structurally sound/ fully capable of supporting the lateral loads imparted to it from the Superior Street side. Settlement in the Superior Street sidewalk behind the wall has been noted and repaired in recent years and it is believed the wall has moved/ displaced away from Superior Street from the imparted loads. It is possible that the demolished building/ parking deck provided lateral support to the wall which is no longer present since the demolition activities. Prior to moving forward with the substantial infrastructure investment for Superior Street on the wall's back side, it will be important for the wall's structural condition to be thoroughly understood and, as warranted, any necessary reinforcement, repairs or replacement be performed. Since it is believed the wall is on private property and thus potentially the responsibility of the private property owner, this assessment work will also need to be coordinated with the property's owner

Utilities

- » General
- » Storm Sewer and Drainage
- » Sanitary Sewer
- » Water
- » Steam
- » Minnesota Power
- » Private Utilities

SUPERIOR STREET UTILITIES PERSPECTIVE

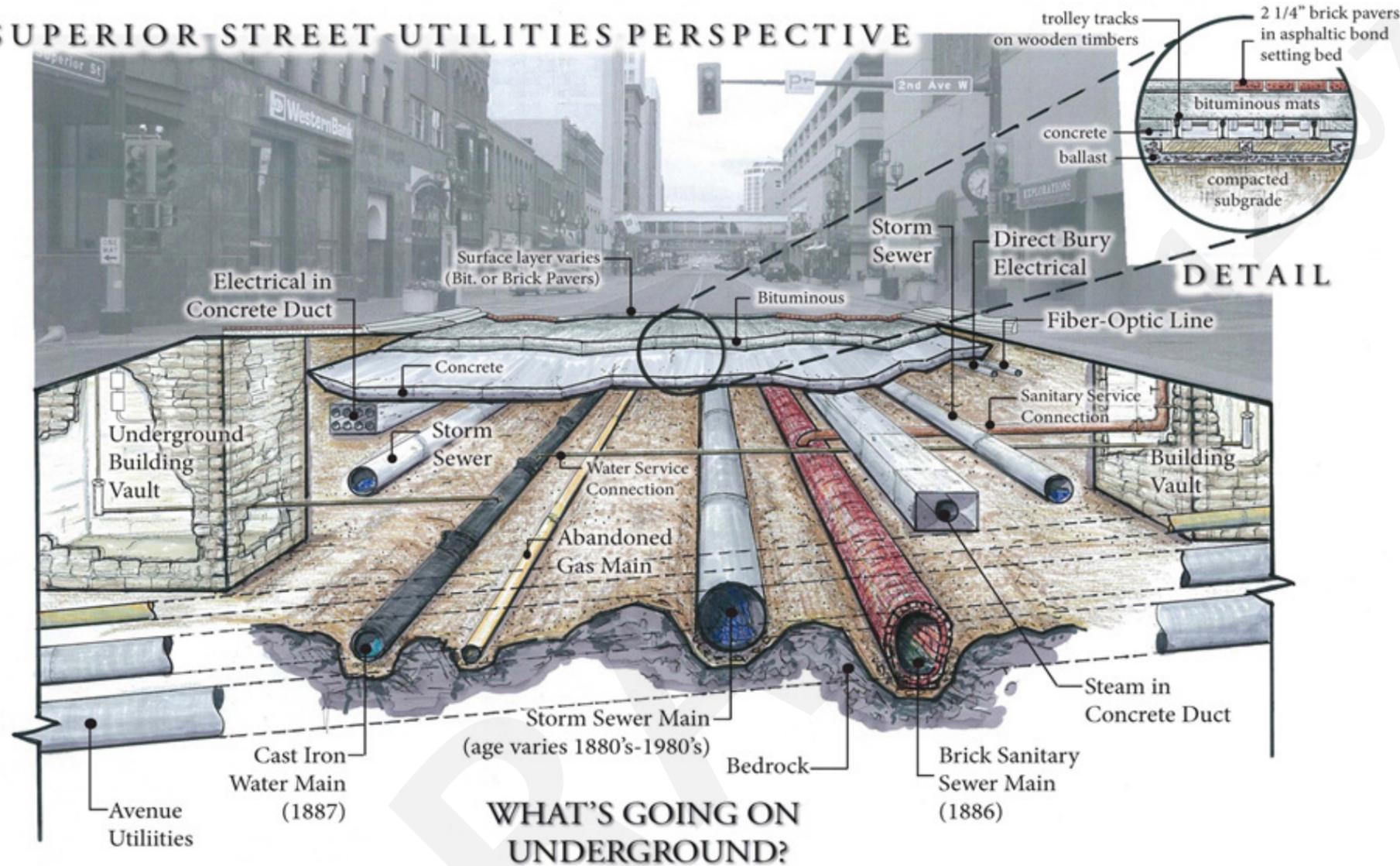


Figure 1.70 Utility cross-section.

General

The City's main intent for the Superior Street project is to replace or rehabilitate the existing utility infrastructure beneath the street such that no new maintenance or repair work will be required for the foreseeable future and will be limited to emergency repairs. The City intends to issue a moratorium on excavation within the Superior Street corridor for any non-emergency work for a period of years following the completion of the project. The limits of utility work at the intersecting avenues will, where practicable extend new utilities to a point above and below Superior Street where future excavation to connect to the new mains will not require the closure of Superior Street. The City has directed that all utility trench soils shall be replaced with imported granular backfill.

Storm Sewer and Drainage

Profile grades on Superior Street are flat and generally vary between less than 0.5% to 2%. Project low points occur at Superior Street's intersections with 4th Avenue West, Lake Avenue, and 1st Avenue East. Project high points occur at the project termini and 2nd Avenue West.

Existing storm sewer infrastructure is primarily located at the Avenues, where surface runoff from the interior of any given block is intercepted by curb inlets at the intersections and enters trunk mains running down the avenues toward Michigan Street and Lake Superior. In-place mains are generally RCP with some DI and brick pipes and range in diameter between 12-inches (catch basin leads) and 48-inches. In addition, most blocks feature a 12-inch PVC storm sewer main serving building roof drain leads that runs parallel with the street before connecting to storm sewer mains at the Avenues.

The proposed project will replace all storm sewer, inlets and manholes on the project. In addition, the City intends to place mid-block inlets on all streets to improve drainage. No permanent stormwater treatment is required for the project. An existing sedimentation basin located at I-35 currently receives stormwater from the project area and is maintained by the City.

During construction, inlet controls and erosion control devices will be implemented to prevent discharge of sediment laden water to the storm system. Temporary pipe connections and/or bypassing of stormwater flows will be implemented as needed.

Sanitary Sewer

The City of Duluth’s sanitary main on Superior Street was installed around 1886 and consists generally of egg-shaped brick sewer with some clay and RC pipe. The egg-shape design is a remnant of the older combined sanitary and storm sewer systems. At that time, relatively low daily sanitary flows were accommodated by the narrower trough at the bottom of the pipe. When larger rain storms occurred, the storm surge was accommodated in the wider, upper sections of the pipe.

In general, the sanitary main is located 12-ft to 15-ft north of center line at depths up to 15-ft below the street. Buildings on the north side of Superior Street are connected to the sanitary main in Superior Street whereas buildings on the south side of Superior Street are generally connected to the main in Michigan Street.

Sanitary sewer mains and services will be rehabilitated using cured in place lining by the City prior to the start of the proposed project.

Water

The City of Duluth’s 125-yr old, 16-inch cast iron water main runs the entire length of Superior Street. The main was installed around 1887 and although the pipe itself is in generally good condition given its age, the old lead joints are deteriorated and are an ongoing concern. In general the existing main is located 12-ft to 15-ft south of the center line of Superior Street and its depth varies up to 9-ft below the street. Water pressures in the downtown area generally vary between 75 and 126 psi. For the most part, buildings along Superior Street are connected to the water main by 1-inch to 6-inch copper, DI, or CI service lines running between the main and the buildings.

The City intends to replace all water mains, valves, hydrants and services on the project with HDPE pipe. The new main will be 20-inch SDR 11 DIPs. The City anticipates providing a combined water and fire service to adjacent buildings. The City intends to meet directly with individual building owners to establish the service needs and configuration of each service to be provided. The general intent is that the City’s street/utility contractor for the Superior Street project will excavate and provide the service penetration into the building. The new HDPE service will be brought into the building where the building owner’s plumber will complete the connection to existing building system including any split between the building’s domestic

and fire service systems. Hydrant coverage is to be provided for each block at the avenue intersections.

During construction a temporary water service will be installed to maintain services to buildings. Building owners will be formally notified in advance of the project that a suitable connection point for the temporary water system must be provided. The City will dictate the size and configuration of the temporary water main and services to meet the needs of the building domestic and fire service.

Portions of the existing main occur within segments where shallow bedrock is known to occur. Rock removal via mechanical methods is anticipated to provide the required minimum trench width and bedding for the new 20-inch main.

Steam

The existing steam utility generally consists of 12-inch to 18-inch steam supply pipe encased in concrete duct with 3-feet to 4-feet+ of cover. The steam line is generally located 20-feet to 25-feet north of the corridor center line. Waste heat from the current system is currently vented to the City sewer systems. The existing steam pipe contains asbestos.

The steam utility intends to replace the existing steam system with a new hot water distribution system. The west limit of the hot water work will consist of new main west of 6th Avenue West to provide new hot water lateral connections to the Gateway Tower and Lennox buildings. In general the new system will consist of two 8-inch (ID)/14-inch (OD) mains in parallel with an overall width from outside edge of pipe to outside edge of pipe (width) of 3.3-feet and installed with a minimum of 2-ft of cover and 6-inches of bedding. The new system will include vents, drains, thermal expansion compensation, leak detection and communication conduits. The hot water design day pressures and temperatures are 250 psi and 250-degrees (F), respectively. The hot water piping design will comply with EN 13941 Standards. The proposed routing will generally follow the existing system alignment.

Minnesota Power

Minnesota Power’s existing high-voltage distribution system on Superior Street is located primarily west of 4th Avenue West. The remainder of its system servicing Superior Street buildings is located in the alley between 1st Street and Superior Street and on Michigan Street.

Minnesota Power (MP) intends to replace its existing facilities on Superior Street between 6th Ave West and 4th Ave West and crossing Superior Street at 6th Ave West; the Radisson near 5th Ave West; 4th Ave West; 1st Ave East and 2nd Ave East. In addition, Minnesota Power will construct new duct bank on Superior Street between 4th Ave West and 2nd Ave East and crossing Superior Street at all Avenues not listed above (taps up/down avenue for future connections to alley and Michigan Street to be provided). New vaults would be installed at each intersection.

In general MP’s facility will consist of an array of 6-inch PVC conduit encased in concrete. Typical MP vaults are 8-ft x 12-ft x 8-ft (l x w x d) precast structures. The new duct bank will generally follow existing system alignments. East of 4th Ave West, the new system is anticipated to replace MP’s existing abandoned duct bank system located on the south side of Superior Street.

Private Utilities

In addition to the City of Duluth, Duluth Energy, and Minnesota Power, the following utility companies are identified as having facilities within the project area:

- Charter Communications
- Frontier Communications
- Windstream KDL, Inc
- Mn/DOT
- Paul Bunyan Telephone
- CenturyLink
- WLSSD

As part of the preliminary design phase, two coordination meetings were held with each utility owner to confirm the location of existing utilities and to discuss the upcoming project. In general, the utilities of those listed are located along the Avenues intersecting Superior Street and are depicted in the project survey. Each utility owner was notified of the City’s intent to issue an excavation moratorium in Superior Street and were requested to advise if they had any plans to upgrade, replace or install new facilities within the project corridor. All replied that they had no such intent at that time.



Figure 1.72 Image of egg-shaped brick sewer on Superior Street.

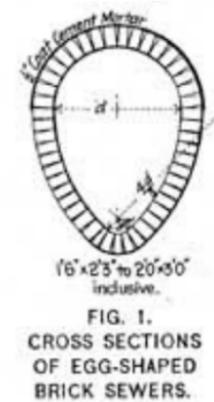
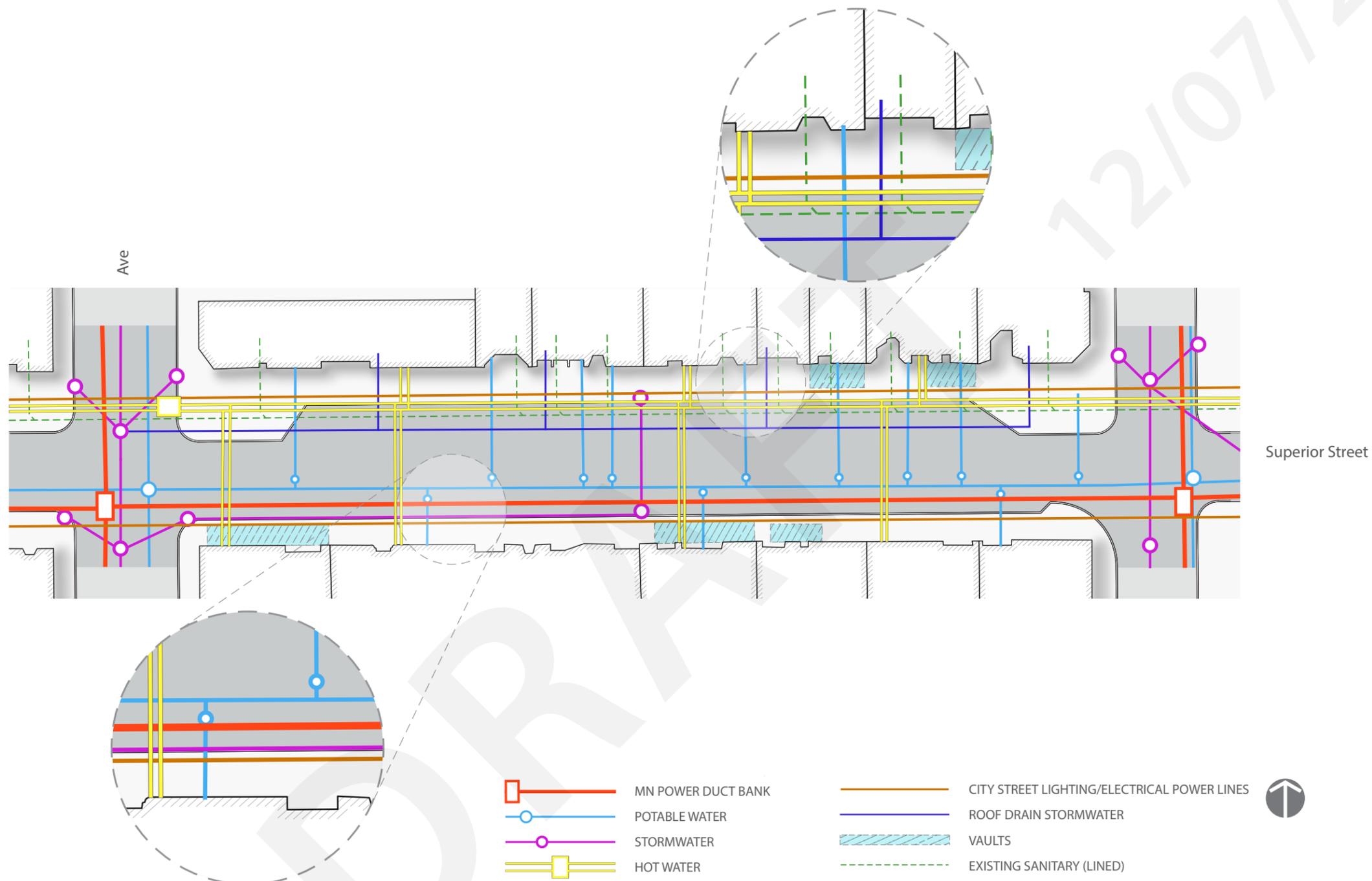


Figure 1.71 Diagram of egg-shaped brick sewer.



Utilities

The general below grade utility work on the project is depicted in the illustrative plan view, Figure 1.73. Proposed utilities are shown in their approximate locations relative to the building faces and street elements. The intent is to replace utilities at their existing locations.

Utility work scope includes:

- **MN Power Duct Bank:** removal of existing concrete, clay duct bank and replacement with new concrete encased duct bank. 3-ft cover depth (typical).
- **Potable Water:** removal of existing 16-inch cast iron main, service laterals and hydrants and replacement with new 20-inch HDPE main, service laterals and fire hydrants. 7.5-ft cover depth (typical).
- **Stormwater:** removal of existing storm sewer within the project limits and replacement with new reinforced concrete storm sewer. In addition, new storm main will be extended to mid-blocks to improve drainage. Cover depth varies 3-ft to 6-ft+.
- **Hot Water:** removal of existing concrete encased and asbestos lined steam pipe and replacement with new direct bury hot water supply/return system. 3-ft cover depth (typical).
- **City Street Lighting/Electrical Power Lines:** Removal of existing small diameter electrical conduit and wiring and replacement with new shallow bury conduit and wiring. 2-ft cover depth (typical).
- **Roof Drain Stormwater:** Removal of existing storm drain that intercepts roof drain leaders from building. Located on both sides of Superior Street on some blocks. Existing building leaders will be connected to new roof drain leaders. Cover depth varies.
- **Vaults:** Vault work may include repair of existing vault structure, roof water-proofing or abandonment.
- **Existing Sanitary (Lined):** The City intends to line the existing sanitary main and laterals prior to the project.

Figure 1.73 Utility typical plan.

Street and Utilities Typical Cross-Sections

The typical street and utility cross sections depict the surface and below grade work.

At the surface level, the preliminary design calls for a 3-ft “section” meaning that existing street pavements and base materials will be removed to a depth 3-ft below the proposed street grades. A 3-ft section is viewed as necessary to minimize the potential effects of differential movement due to varying subsoil conditions and potential frost heave. Proposed street grades are anticipated to generally match in-place street grades to ensure tie-ins to adjacent building doorways and thresholds.

After removal of the in-place paving and base materials, the native soils are compacted in place and a geotextile separator fabric is placed over the native material to prevent intermixing of the native road material with the new base materials to be placed. After the separator fabric, a drainable base layer is provided to provide structural support for the road and to provide a pathway for subsurface water to flow to perforated roadway subdrains at each side that will collect such flows and direct them to the adjacent storm sewer. Controlling water in the subgrade minimizes free water in the pavement base layers and promotes stability by limiting the effects of soil saturation and potential frost heave or differential settlement. After the drainable base layer is placed, an aggregate

base layer is placed to provide additional structural support to the roadway and to serve as a stable platform for final paving equipment and activities. Following placement of the pavement base layers, concrete curb and gutter, roadway paving and sidewalk placement can occur.

Utility work will occur prior to the surfacing activities described above. The utility section, Figure 1.74, depicts the approximate location of the utilities below Superior Street on any given block and is a companion exhibit to the utility plan on the preceding page: utilities are similarly color coded on the two exhibits for cross referencing. The north side of Superior Street is on the left of section. The utility section view depicts approximate, relative depths of the utility work on Superior Street for a representative block. The dashed black prism that encloses each utility represents an idealized trench excavation limit and gives an approximate sense of the impact area of each utility operation on the surface of the street. For any given utility operation, a similarly sized pile of excavated material can be expected next to the trench and/or will be occupied by hauling trucks and excavation equipment. This section also depicts an existing building vault adjacent to the building façade. Again, depending on the condition of the vault and the building owner/tenant desire to keep the vault, repair of the vault, waterproofing and/or abandonment of a vault may be in order. The section does depict the actual state of many vaults wherein the roof of the vault is immediately below the sidewalk on the street.

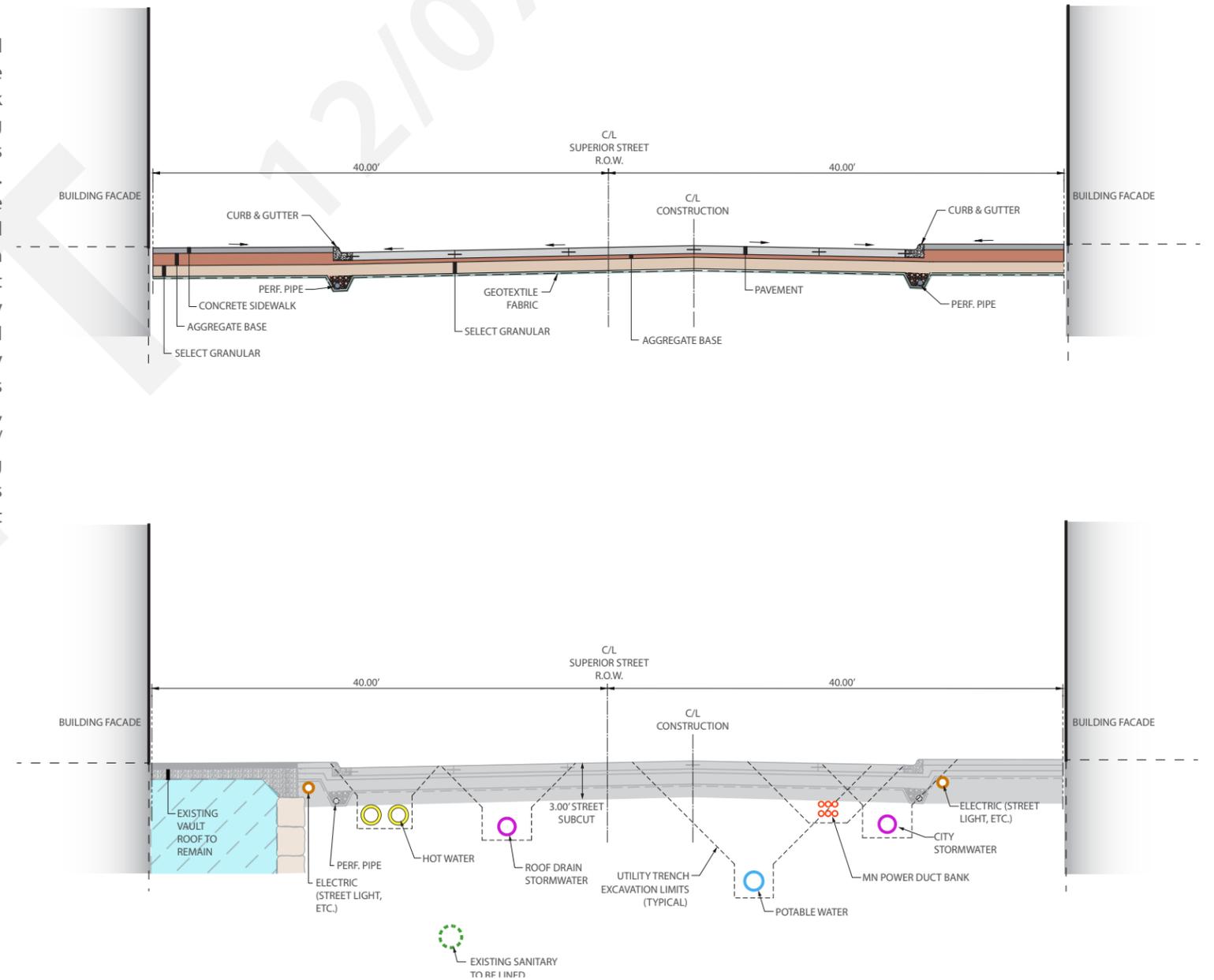


Figure 1.74 Street and utility typical cross-section.

Geotechnical and Environmental

- » Overview
- » Geotechnical
- » Environmental

Overview

Based on a review of historic plans and available information, subsurface conditions below the existing surfacing are known to vary which will be an ongoing concern in the final design phase. Geotechnical concerns include the presence of bedrock, frost susceptible soils, subsurface water, and other adverse or unknown soil conditions. In addition, the varied and changing use of Superior Street and the businesses and industries which have used it over time, raised added concerns regarding the potential for environmental issues including hazardous or contaminated soils, waste or groundwater. In an effort to identify potential issues and risks, geotechnical and environmental studies of the corridor were performed as part of the preliminary design phase.

Geotechnical

A geotechnical evaluation was provided to provide subsurface soil and groundwater information and geotechnical recommendations for use in design and construction of the proposed street reconstruction project. Sixty-five borings were completed for the project with initial boring locations intended to be completed every 100 feet along the alignment. Boring locations were altered to avoid existing underground utilities or to target specific areas for environmental analysis as part of the project Phase II investigation. The borings were intended to extend to 15 feet or refusal on apparent bedrock. All of the borings were drilled through existing pavements. The pavement thicknesses were documented. Standard Penetration Test Sampling was conducted to the termination depths of the borings.

The borings encountered brick, concrete and bituminous pavements at the surface. The pavement is underlain by silty sands and lean clays glacial tills. Many of the borings encountered fill (materials placed by man rather than by nature) over the till. The fill was similar to the underlying native soils.

Auger refusal was encountered in 32 of the 65 borings at depths ranging from 2.1 to 15.3 feet; auger refusal can be caused by cobbles, boulders, hardpan, debris or bedrock. Based on our experience in the area, and our offset borings, it is our opinion the refusal was typically caused by bedrock.

Additional design recommendations and design parameters for the installation of underground utilities and new pavements are included in the detailed geotechnical report attached to the

document. We evaluated the traffic and provided designs for both bituminous and concrete pavements.

Environmental

An environmental evaluation of the corridor to identify the potential for encountering contaminated soil or groundwater during construction was performed as part of the preliminary design phase. The environmental evaluation involved completion of the following five components:

- Regulatory records review
- Site reconnaissance
- Interviews
- Regulatory site file reviews
- Reporting

Based on the results of the environmental evaluation, further environmental study and work was performed to complete a Phase II investigation and prepare a Response Action Plan (RAP) and Construction Contingency Plan (CCP).

The purpose of the Phase II investigation was to evaluate the Superior Street corridor for the potential presence of contamination in specific areas identified from the environmental evaluation. The Phase II investigation field activities were conducted in conjunction with the geotechnical evaluation in the fall of 2014. Environmental soil screening and sampling was completed in order to evaluate and document the potential for contamination in the subsurface. The soil encountered within environmental borings was observed to be primarily red-brown clay inter layered with silty-sand or sandy-silt. The soil encountered is likely a representative combination of fill soils that have been placed or disturbed during previous utility and roadway construction activities and native clay till. Low level petroleum impacts were discovered in soil at three of the 43 environmental boring locations along the corridor.

Based on these results, the property was enrolled in the Minnesota Pollution Control Agency (MPCA) Voluntary Investigation and Cleanup (VIC) and Petroleum Brownfield (PB) Programs. The VIC and PB numbers assigned to the Property are VP32630 and 4791, respectively.

A response action plan and construction contingency plan (RAP/CCP) was prepared to address the contaminated soil expected to be encountered during construction. The RAP/CCP presents the methods, actions and controls proposed to be implemented to protect human health and the environment during the Superior Street reconstruction. It is anticipated that the RAP/CCP will be submitted to the MPCA for approval in late 2015.

The objectives of the RAP are to manage contaminated soils encountered during construction along the corridor and to restrict future contact with the contaminated soils that may remain after response actions are completed. The RAP will include:

- Segregation and disposal of contaminated soils that may be removed to construct the project. Such soils will be disposed at an approved, off-site, permitted landfill facility.
- Documentation of potentially contaminated soils remaining at the limits of the project area.
- Removal of unregulated fill to off-site locations.

The CCP presents proposed contingency methods to be used and actions to be completed in the event of discovering additional hazardous substances or petroleum products not currently known or documented within the corridor, but which may reasonably be expected to occur due to the past history of the current or former businesses identified. The CCP also outlines the procedures that will be required for the contractor during construction activities to protect human health and the environment.

Construction Phasing/Staging

- » Overview
- » General Sequencing Requirements

- » Major Construction Elements

Overview

At this time, the City of Duluth has selected a three year construction phasing plan for the preliminary planning analysis; however, a final decision regarding the staging and sequencing will be determined during final design. In general, the construction is to be divided into three or four block segments that proceed as follows:

- Year 1: construction of west blocks beginning west of 6th Ave West and extending to 3rd Ave West.
- Year 2: construction of easterly blocks beginning at 1st Ave East and extending to 4th Ave East.
- Year 3: construction of remaining middle blocks.

The City has identified a number of factors it believes drive the need for a three year construction duration as they are expected to affect the Contractor's operations. These are principally:

1. The need to maintain pedestrian traffic and business access through the corridor and ensure all work assigned to a given year is completed that year.
2. The multiple and unique work type requirements within the project corridor.
3. The constrained conditions of the corridor in terms of space and access.
4. Project uncertainties and associated risk including unknown or changed conditions and weather.

To minimize the impacts to businesses along the corridor, it is a requirement of the design to maintain pedestrian access to storefronts throughout all phases of the construction. Although some businesses can be served from the Skywalk System, maintenance of storefront access is considered critical to businesses weathering the construction period. In general it is anticipated that a 5-foot walk width will be maintained through the corridor on each side of the street and typically along the building face except where it is temporarily necessary to route the temporary walk around a particular excavation area (e.g. service connection). In some cases, through pedestrian access may be limited to one side of the block with separate temporary walks crossing the street. Individual block requirements and conditions will require

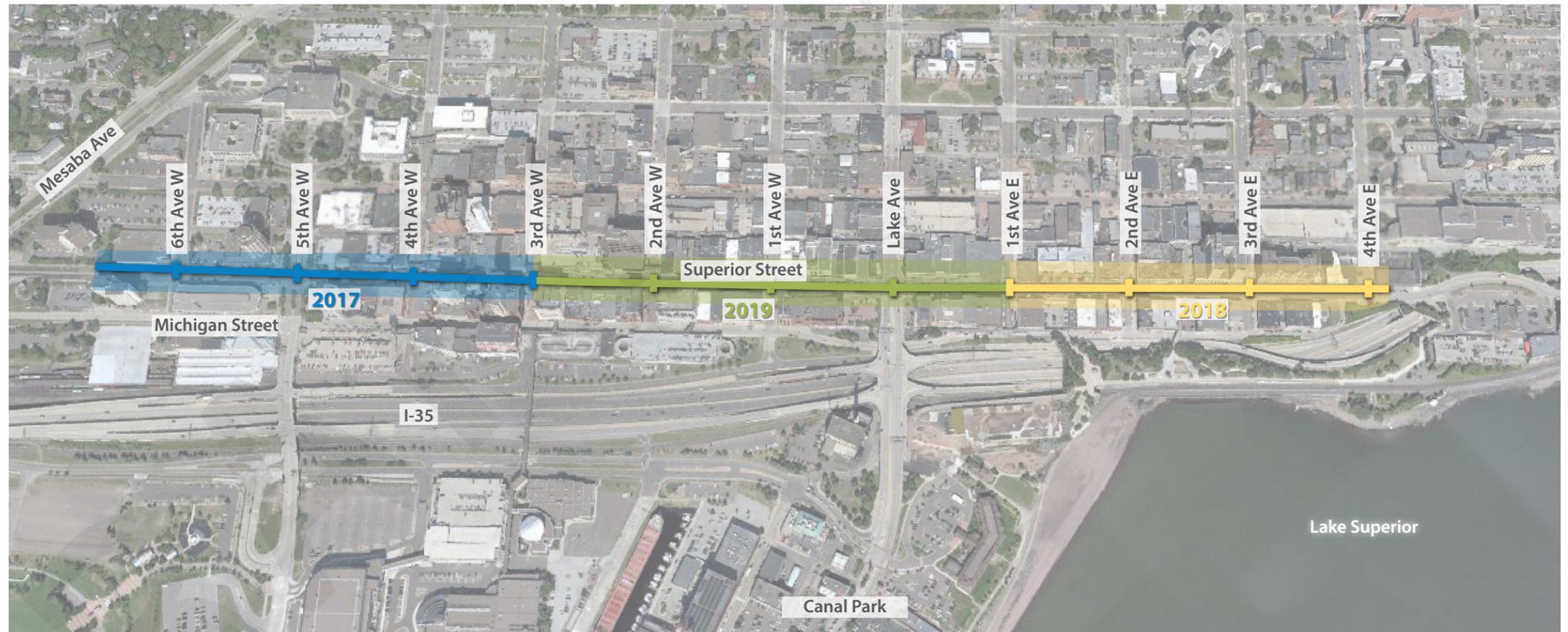
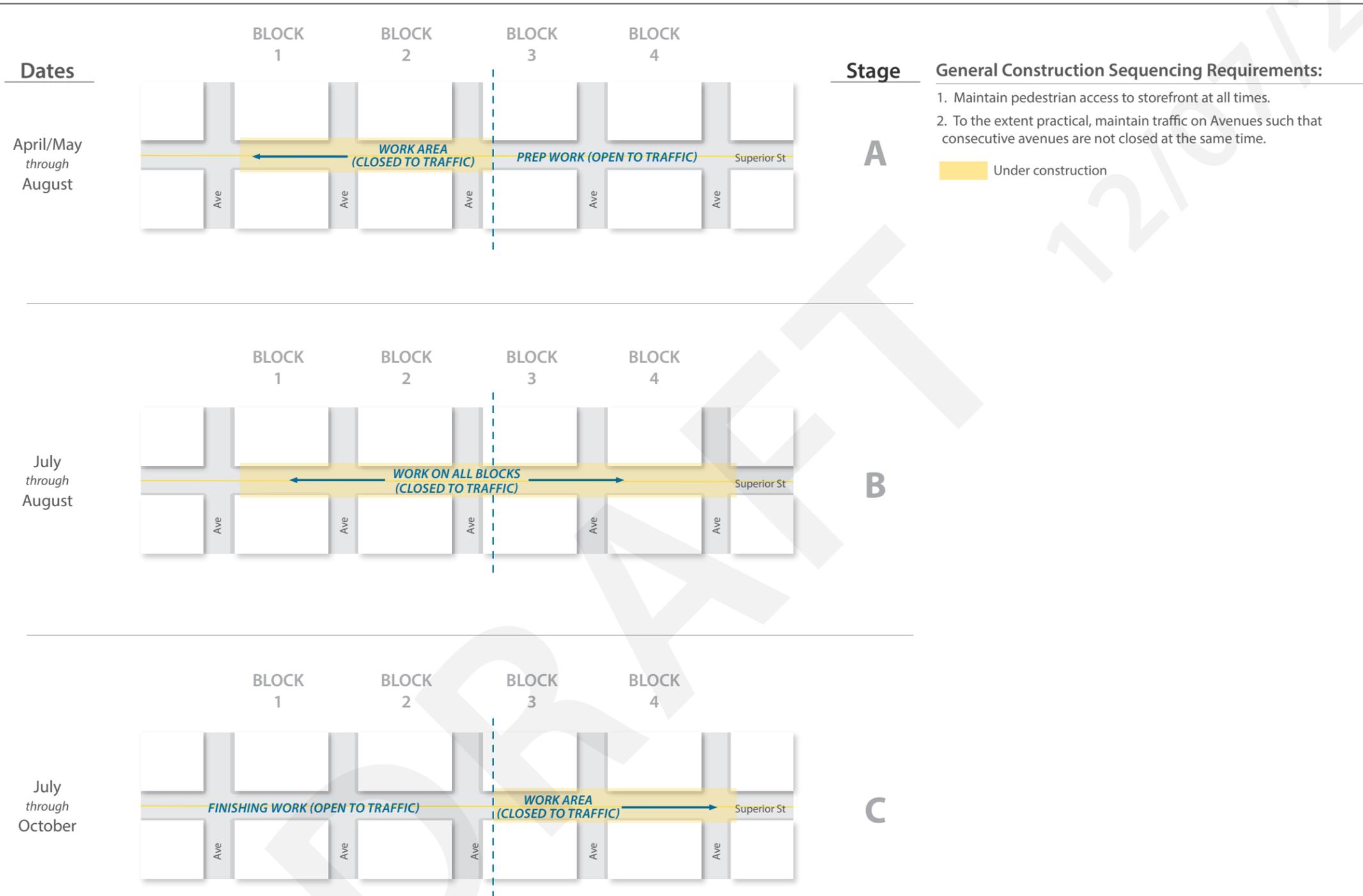


Figure 1.75 Construction phasing diagram.



flexibility in the design with clear requirements for staging and access made clear to the contractor. Temporary pedestrian access routes are expected to be ADA compliant unless it is impracticable to do so in which case alternate routes are expected to be designated and provided. In addition, it is highly desirable to maintain vehicle traffic along Avenues to maximum extent practicable so that consecutive Avenues are rarely closed at the same time in an effort to minimize the distance customers have to travel by foot through the construction zone. Temporary aggregate or bituminous paved surfaces are anticipated. It is expected that the Contractor will be required to aid and facilitate deliveries to businesses where delivery vehicle traffic is not possible due to construction activities.

General Sequencing Requirements

A four block schedule analysis was performed as part of the preliminary design. The analysis was based on the work proceeding in a typical fashion from one end of a construction stage to the other and as generally described in Figure 1.76. The schedule assumes that only limited concurrent activity for primary work types is possible due to the location of utilities and the space constraints of the corridor. The schedule analysis suggests that completion of a four-block segment in a single year and occurring under the identified constraints is feasible based on a 6-day/week work schedule and 12 hour days. The schedule is based on an early May start date with all paving to be complete in October but does not afford significant float to absorb construction delays related to unforeseen conditions or weather. Opportunities to expedite construction such as early spring start or other staging / sequencing options should continue

Figure 1.76 Construction sequencing diagram.

to be explored. Landscaping, amenity and other streetscape work is expected to be allowed to occur later in the primary construction year or the year following, if needed. Further and ongoing schedule analysis, refinement and alternatives analysis are recommended as the final design progresses.

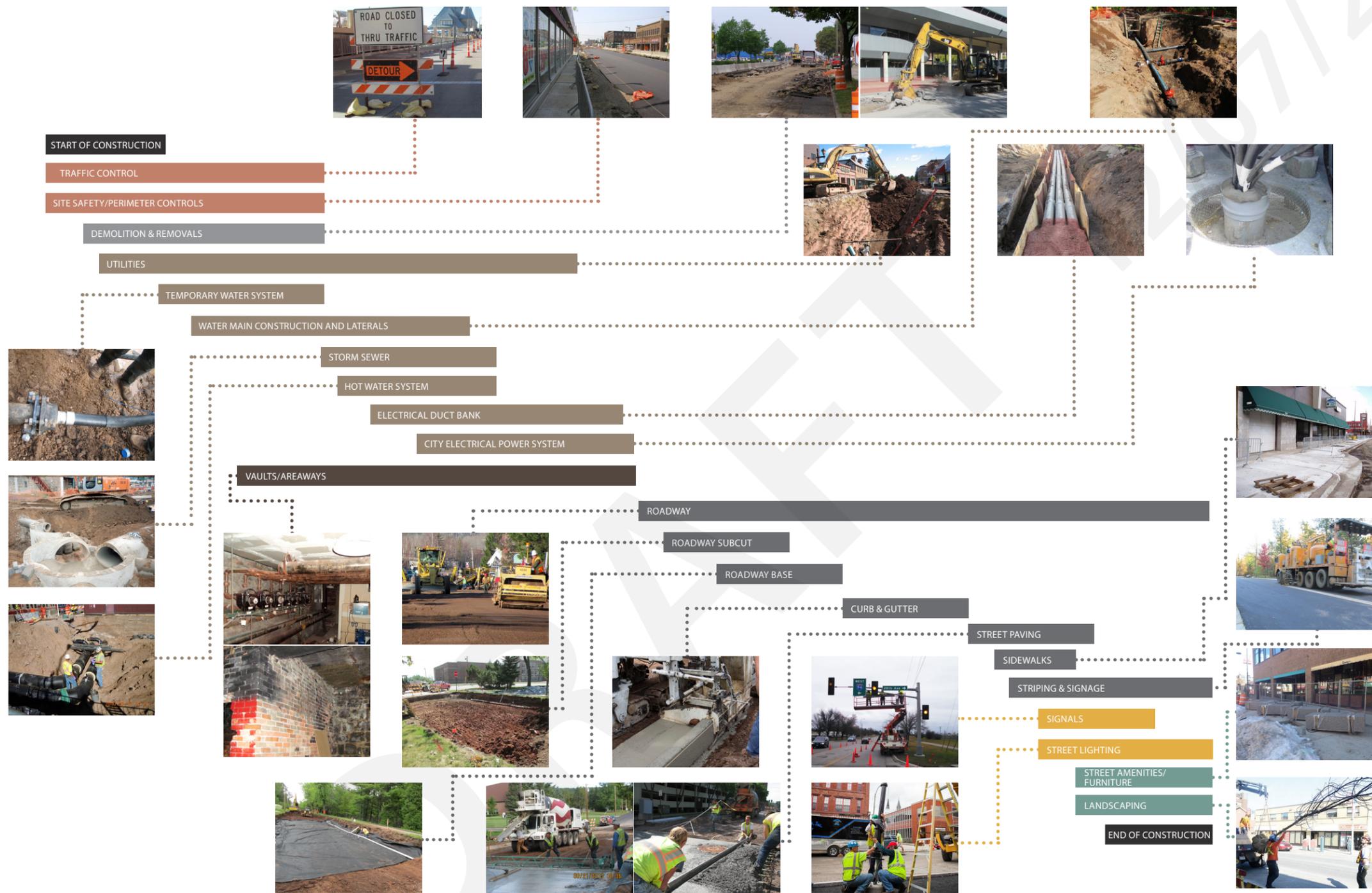
Street Events and Street Closure

Superior Street is a venue for a number of festivals, public and athletic events that utilize the street for a variety of activities.

During construction, advance notice and coordination with event organizers and the Greater Downtown Council (GDC) is recommended to find ways to accommodate events or provide detours or alternative venue accommodation. Figure 1.77 summarizes the major events that affect or utilize Superior Street and should be considered in the final design as part of the project traffic control and construction sequencing planning. In addition, the GDC should be contacted to ensure coordination of the work as it affects other events, business or retail activity on the street along the walks or in the plaza(s) such as the Farmer’s Market located at the Lake Avenue Plaza.

EVENT	MONTH	REMARKS
Fitger's 5k	April	Closure: Lake Ave to 8th Ave East
Grandma's Marathon	June	Closure: 5th Ave West to 12th Ave East
4th Fest	July	Traffic Impacts to Superior Street
Street Dances (Dubhlinn's)	July	Closure: 1st Ave West to 2nd Ave West
Street Dances (Ace's & Roscoe)	July	1st Street Closure: 2nd Ave West to 4th Ave West. Traffic/parking impacts on Superior Street.
Sidewalk Days	July	Closure: 6th Ave West to 3rd Ave East
Tall Ships	August	Traffic Impacts
Superior Man Triathlon	August	Michigan Street Closure (5th Ave West to 4th Ave East). Traffic/parking impacts to Superior Street and avenue closures. Superior Street Closure: 4th Ave East to 10th Ave East.
UMD Homecoming	October	Closure: Lake Ave to 5th Ave West
Gobble Gallup	November	Closure: London Road/13th Ave East to Superior Street at 5th Ave West
Christmas Parade	November	Closure: Lake Avenue to 6th Ave West
Veteran's Day Parade	November	Closure: Lake Ave to 5th Ave West
Future Event: Women's Marathon	TBD	In planning stages, potential start in 2015. Route and impacts to Michigan or Superior Street TBD.
Triathlon	TBD	In planning stages, potential start in 2015. Route and impacts to Michigan or Superior Street TBD.

Figure 1.77 Events and street closures, typical annual schedule.



Major Construction Elements

The work is anticipated to proceed in typical fashion for the street and utility work. Figure 1.78 shows the general progression of work activities through the various stages of the project, beginning with the start of the work at the upper left and progressing through the project to the bottom right and the end of the work. The images shown and linked to each task are meant to provide a general representation of the construction activity. Where tasks are shown overlapping it is meant to acknowledge that some activities will happen concurrently along a 4-block stretch of the street but, again, the space constraints of the corridor and the specific type of work required will limit concurrent activity on an individual block.

Figure 1.78 Construction phasing diagram.

Preliminary Cost Estimate

Project/Cost Estimate

A preliminary cost estimate was prepared based on the identified project scope to identify probable project costs.

Cost estimate methodology utilized a combination of historic unit cost and bid tabulation information for project work types as well as detailed work type estimates built up using standard labor, equipment and material costs. For certain project components, detailed corridor wide takeoffs formed the basis of estimate where discrete quantities of the final design can be readily determined. In other cases, a representative block approach was used where quantities were determined for one block of the project and extended over the multi-block corridor using an appropriate multiplier.

The preliminary cost estimate is shown in Figure 1.79 in 2015 dollars. Actual costs are expected to vary within a range 10% above or below the reported costs. Additional refinement of this project contingency should be made as part of the final design. Inflation costs are not included in the estimate and should be applied at a rate between 3% and 5%, per annum. Inflation costs have not been applied. The project does not include costs related to the proposed steam to hot water conversion nor does it include any costs related to the new electrical duct bank or any other work related to private (non-City) utilities. Right-of-way acquisition is not anticipated at this time, and therefore such costs are not budgeted in the estimate. Future maintenance and operations costs are not included.

Preliminary Cost Estimate Summary		
	PROJECT CHARACTERISTICS/COMPONENTS	SUPERIOR ST.
0	SCOPE	
	Gross Project Length (lin. ft.) (10.7 Blocks of Downtown)	5,110.00
	Gross Project Length (Miles)	0.97
1	RIGHT OF WAY	\$-
	Construction	\$-
	Permanent Easement	\$-
	Temporary Easement	\$-
2	ESTIMATED CONSTRUCTION COSTS	\$28,470,000
	Street	\$10,819,000
	Streetscape	\$3,723,000
	Utility	\$6,646,000
	Lighting & Signals	\$3,174,000
	Building Owners	\$1,407,000
	Transit	\$113,000
	Mobilization (7.0%)	\$1,812,000
	Traffic Control (3.0% - Includes Pedestrian / Business Access Maint)	\$776,000
3	ESTIMATED DESIGN AND ADMINISTRATION COSTS	\$5,409,000
	Preliminary Design (2.0%)	\$569,000
	Final Design (7.0%)	\$1,993,000
	Inspection / Administration (8.0 %)	\$2,278,000
	Construction Materials Testing (2.0 %)	\$569,000
4	TOTAL PROJECT COST	\$33,879,000

Figure 1.79 Preliminary cost estimate summary table.

Operations and Maintenance



Snow Removal



Pruning and Weeding



Street Cleaning



Concrete Repair

Figure 1.80 Operations and maintenance images.

Operations and Maintenance

The City of Duluth's primary maintenance and operations obligations on Superior Street include winter snow plowing; seasonal street sweeping; street and brick repair work; and utility repair work. Meetings were held with City maintenance staff to identify priorities to be considered in the final design as it relates to the day to day operation, maintenance and use of the street.

Superior Street is the City's highest priority for snow removal. However, given the inherent unpredictability of winter weather events and the high volume of traffic and use of the street, snow removal is frequently a challenge. City maintenance staff strongly recommended identifying and prioritizing areas of the street that could be used for temporary snow storage. Minimizing awkward street and curb geometry were emphasized to facilitate plowing. Maintenance staff also expressed the opinion that fixed street amenities that might interfere with plowing and snow removal operations be minimized in favor of movable or removable options.

Maintenance staff also commented that any landscaping items such as trees or shrubs, will need to be hardy to survive the challenging characteristics of the corridor in terms of available sunlight and the use and accumulation of deicing salts in planting beds. Staff recommended the use of salt tolerant trees and landscaping and low maintenance flowers and shrubs or hanging baskets.

The current streetscape layout incorporates many of the key maintenance issues highlighted by City staff through the strategic placement of benches and other amenity to allow for the passage of snow removal equipment. The use of engineered structural soils and tree trenches to promote establishment and long term growth for landscaping and planted elements.

As the final design progresses, it is critical that streetscape elements that impact snow removal and other maintenance activities be vetted with City staff to strike a balance between the aesthetic and community aspirations of the design with the practical maintenance and budget constraints of the City. In addition, it is recommended that the City evaluate and establish an ongoing operations and maintenance budget for Superior Street moving forward to not only preserve the critical and functional aspects of the design but to also fulfill the vision for the corridor as Duluth's signature street as it relates to aesthetics and amenities.

Next Steps

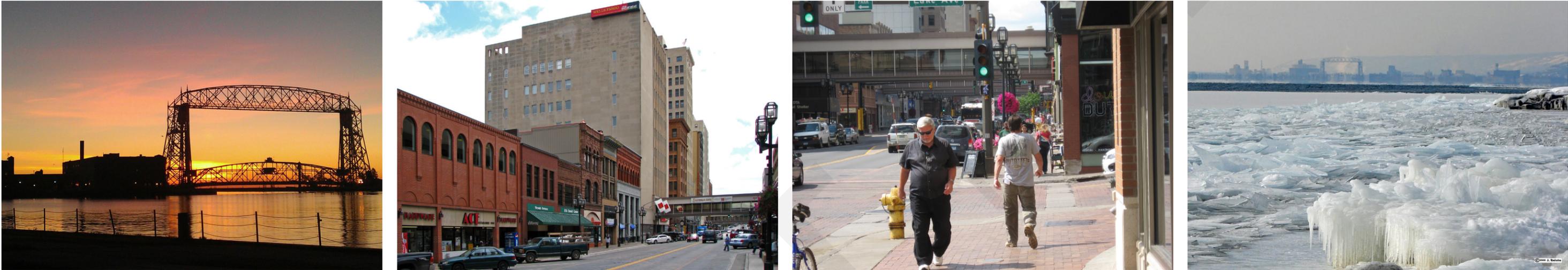


Figure 1.81 Next steps images.

Next Steps

The preliminary design and public involvement phase concludes at the end of 2015 with the submittal of the preferred street and streetscape layouts and this summary document. It is City staff's intent that the layout and summary document are brought before the Council with a resolution of intent that will endorse the recommendations and findings of the preliminary design and public involvement phase as the basis for the final design.

Final design is scheduled to begin in early 2016 with the intent to bid the project in early 2017.

Construction is scheduled to begin spring of 2017.

DRAFT 12/07/2015

Appendix

- » Street Layout
- » Streetscape Layout

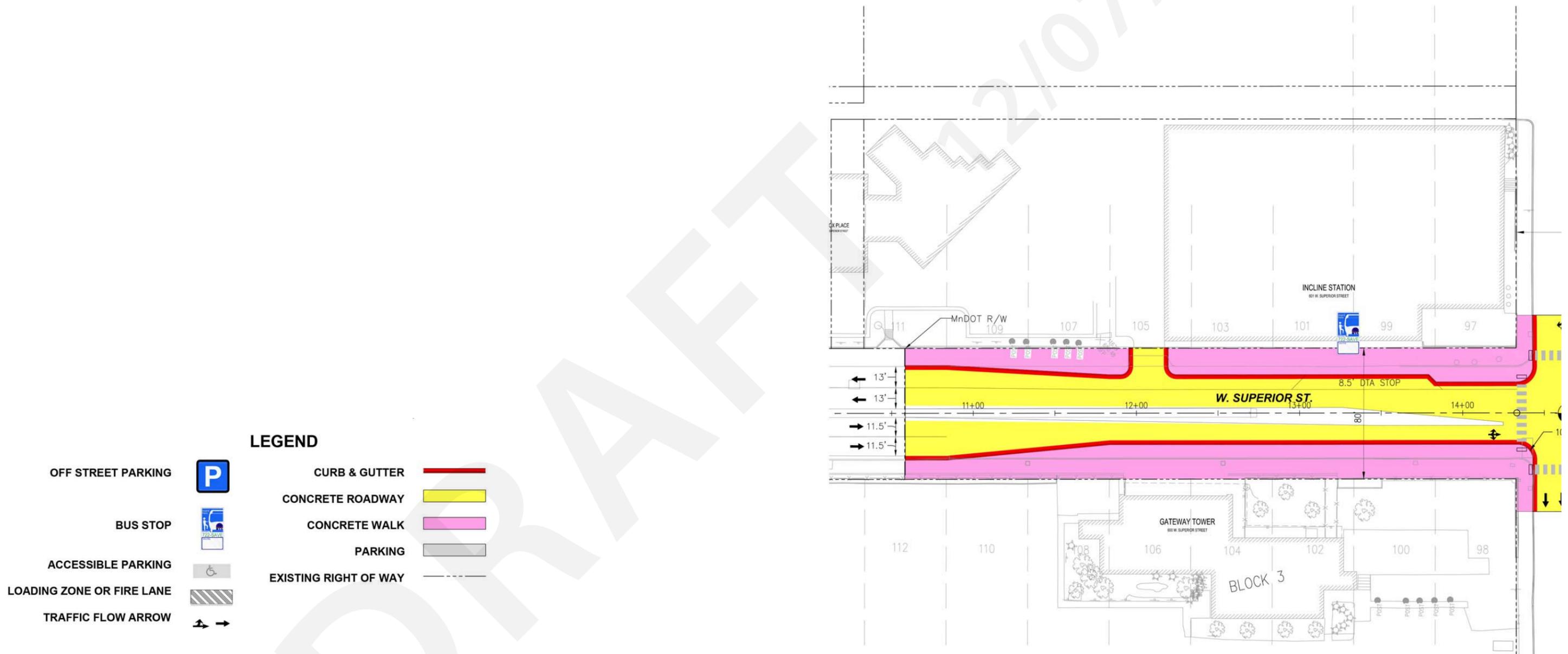


Figure 1.82 Proposed street layout west of 6th Avenue West.

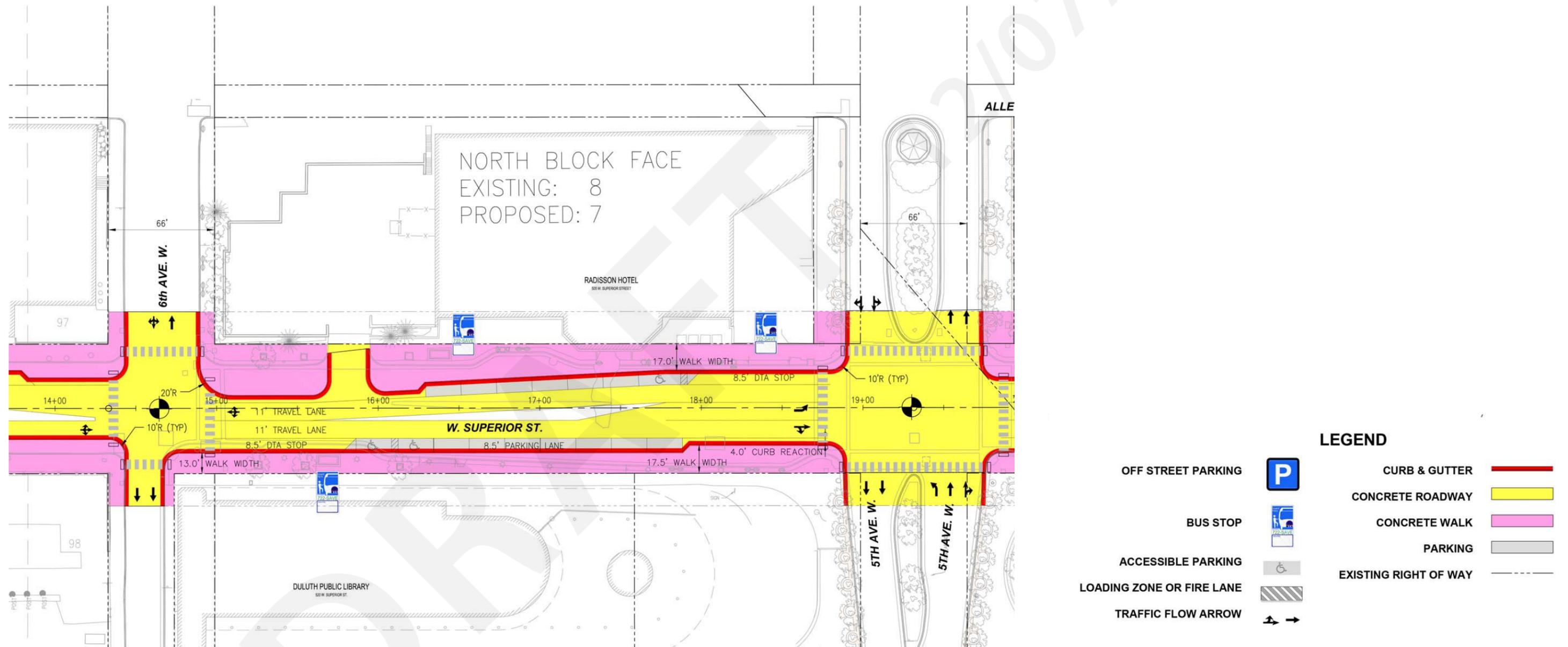
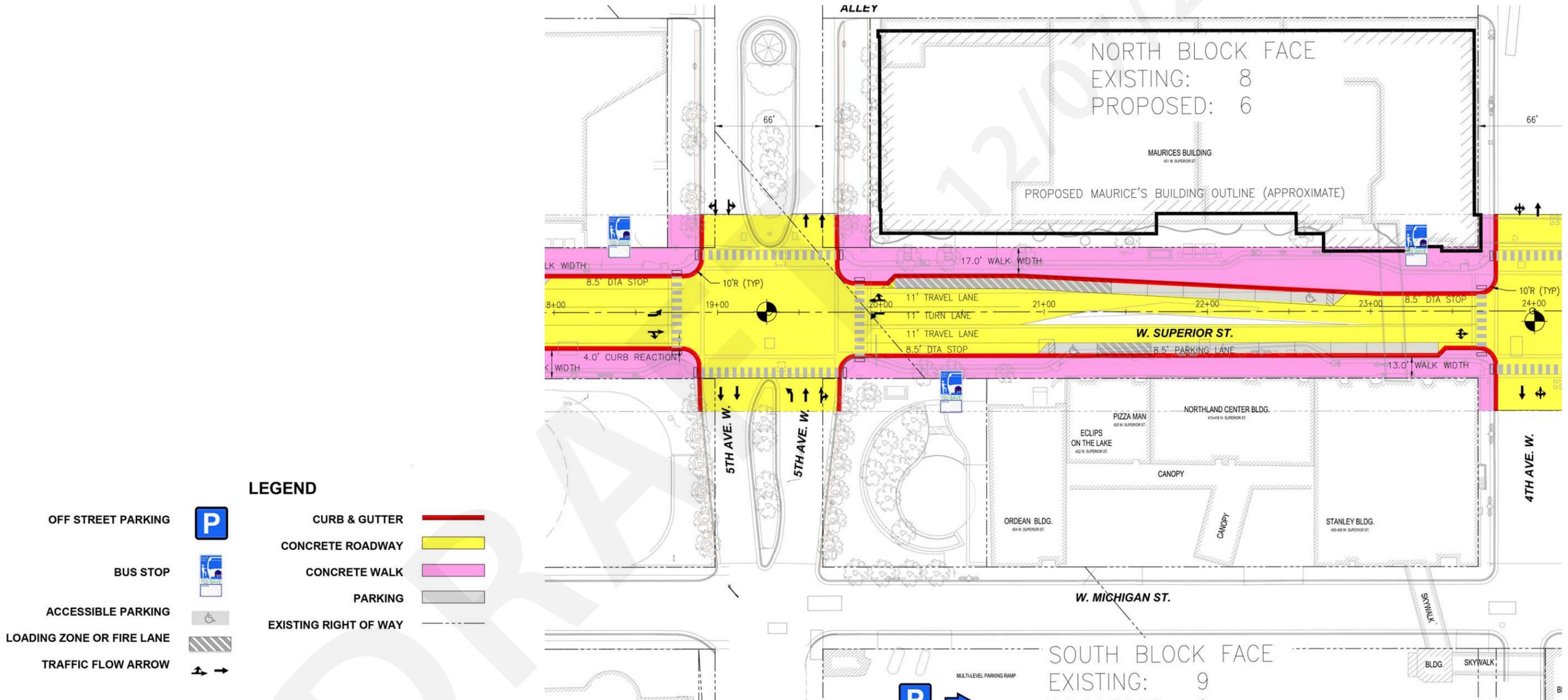


Figure 1.83 Proposed street layout between 6th Ave West and 5th Avenue West.



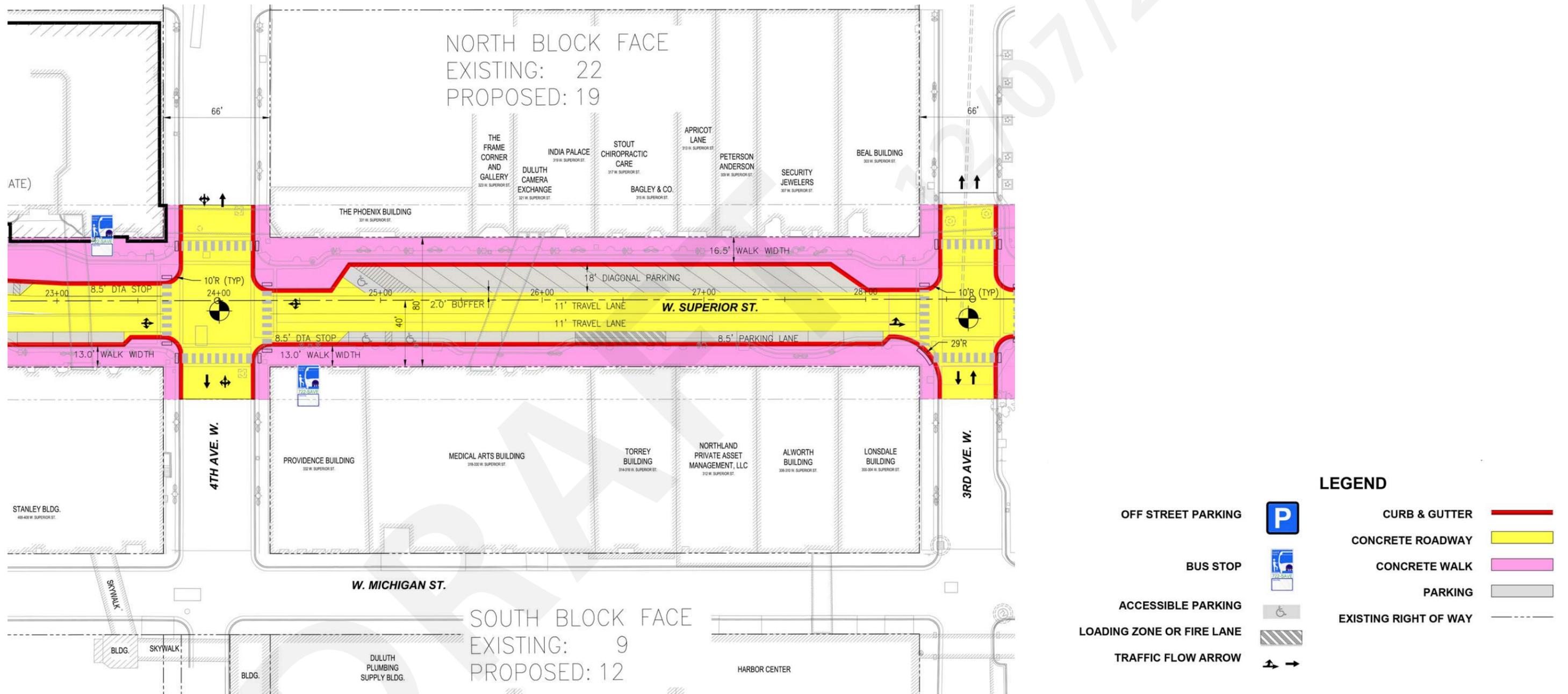
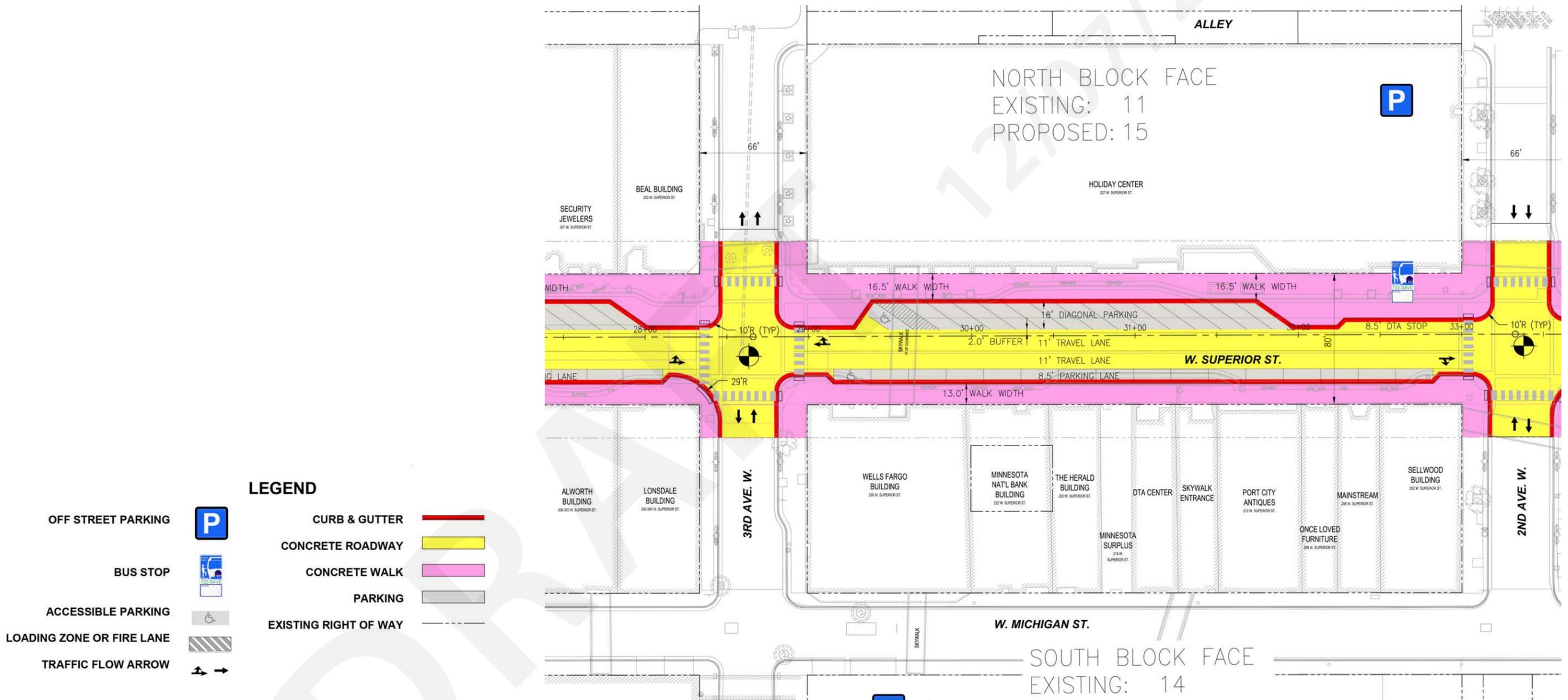


Figure 1.85 Proposed street layout between 4th Avenue West and 3rd Avenue West.

Street Layout and Configuration



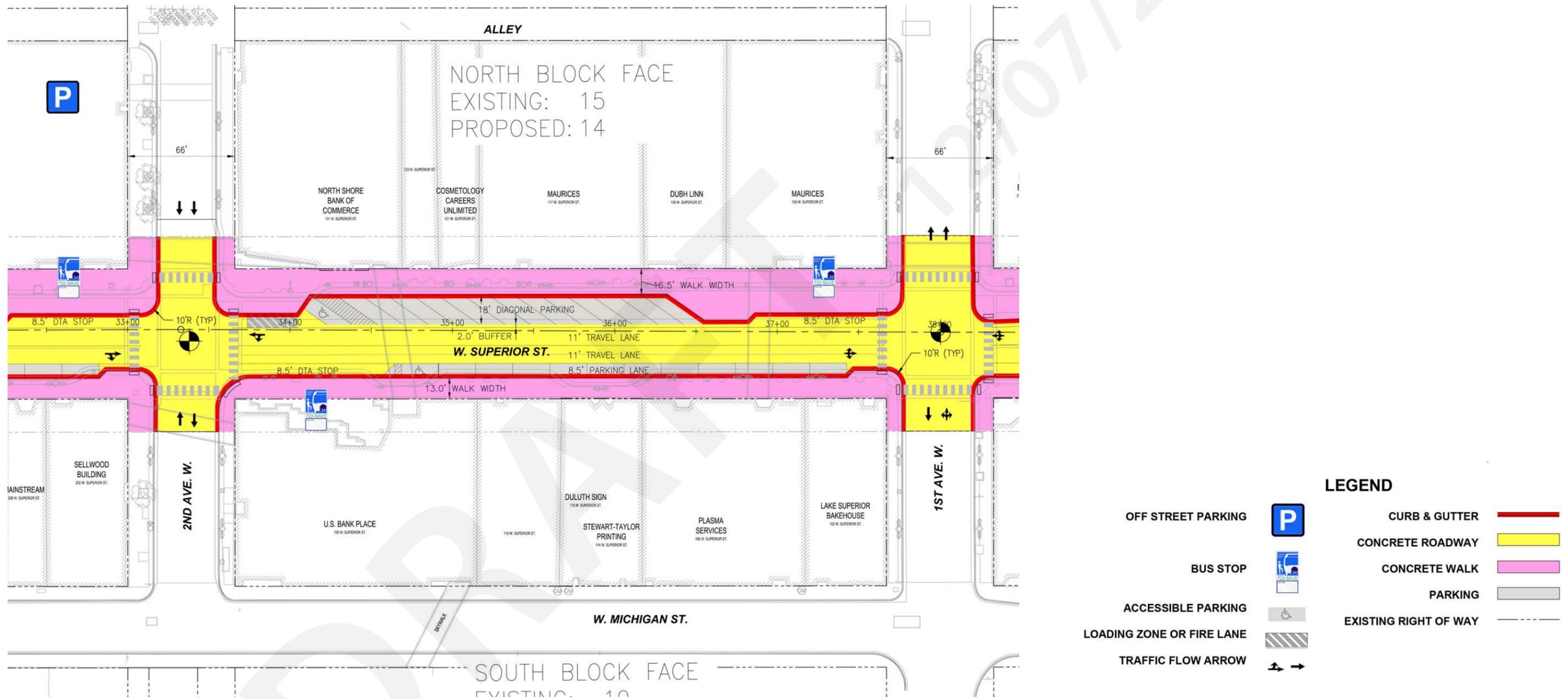


Figure 1.87 Proposed street layout between 2nd Avenue West and 1st Avenue West.

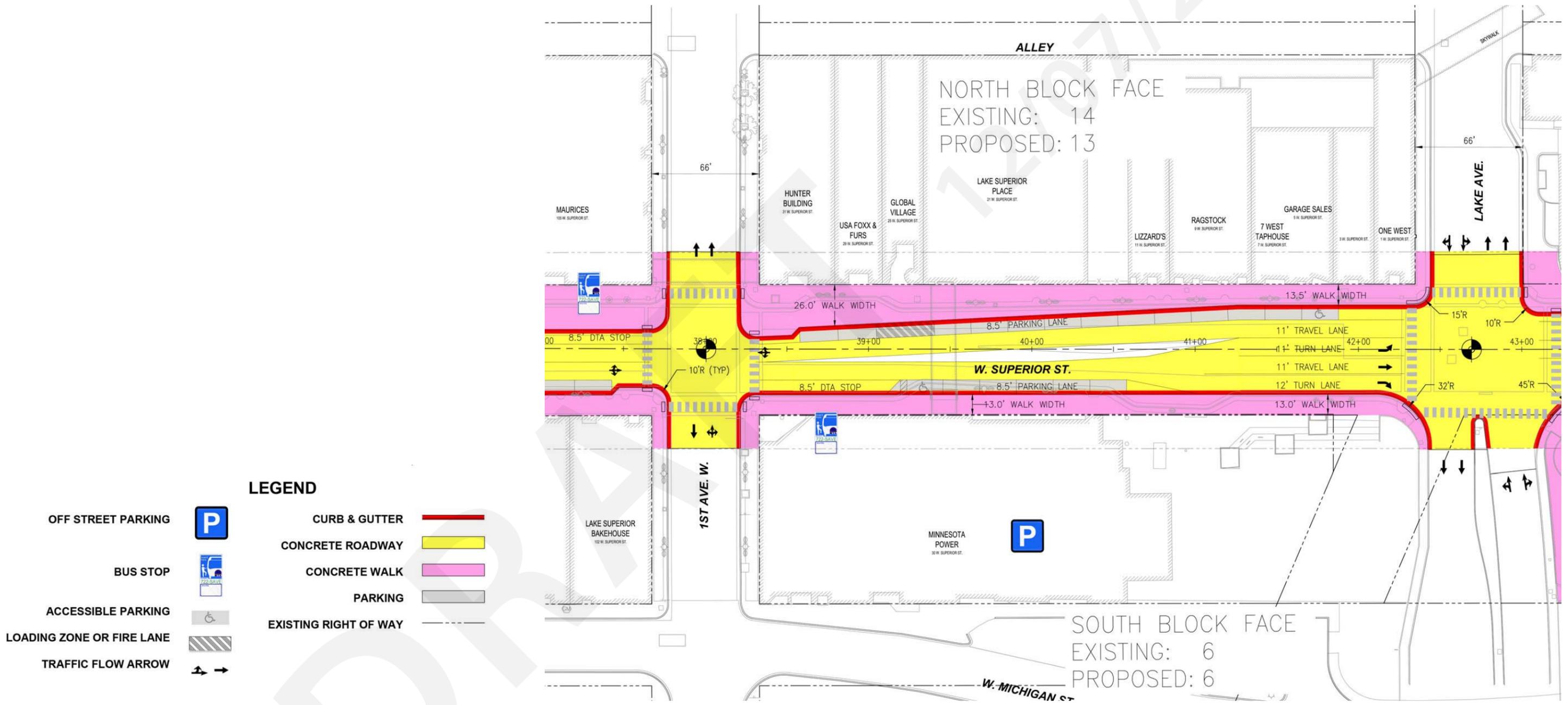


Figure 1.88 Proposed street layout between 1st Avenue West and Lake Avenue.

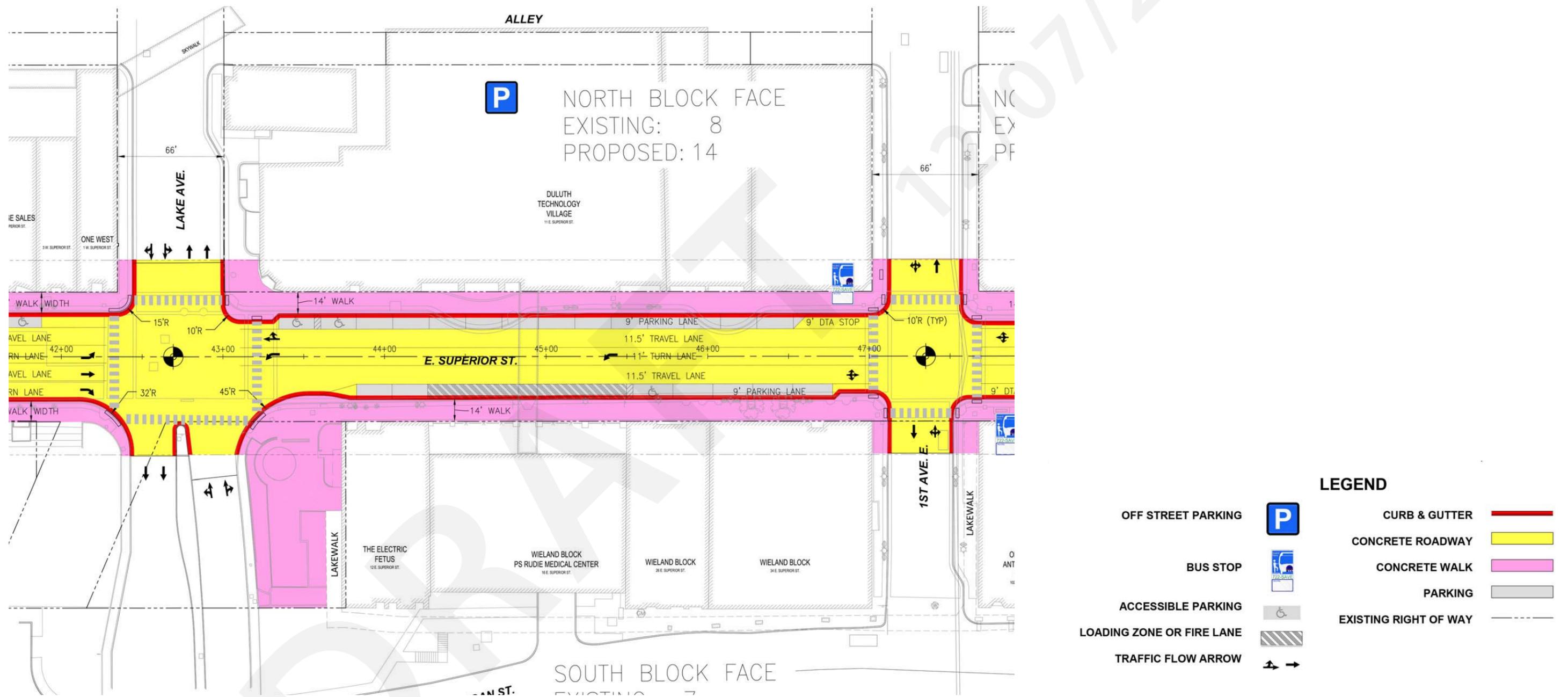


Figure 1.89 Proposed street layout between Lake Avenue and 1st Avenue East.

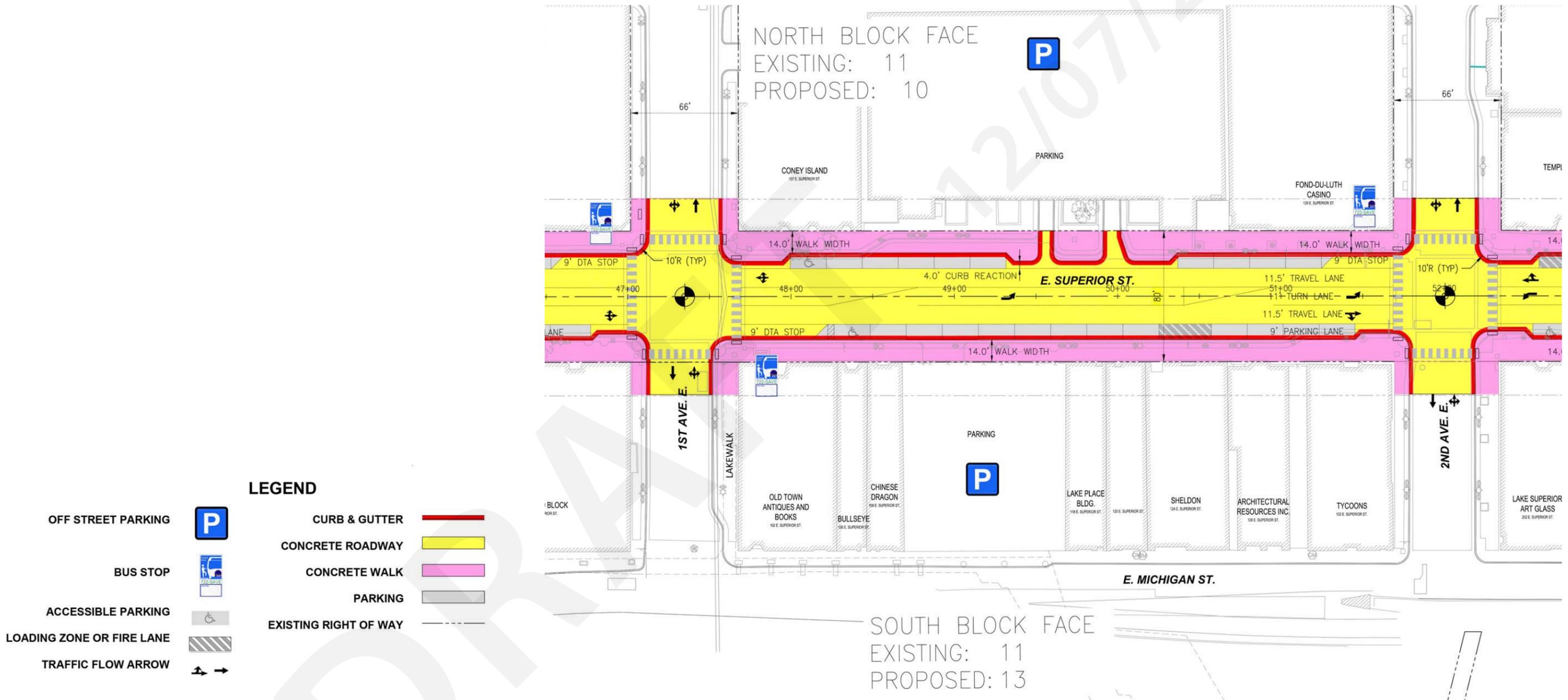


Figure 1.90 Proposed street layout between 1st Avenue East and 2nd Avenue East.

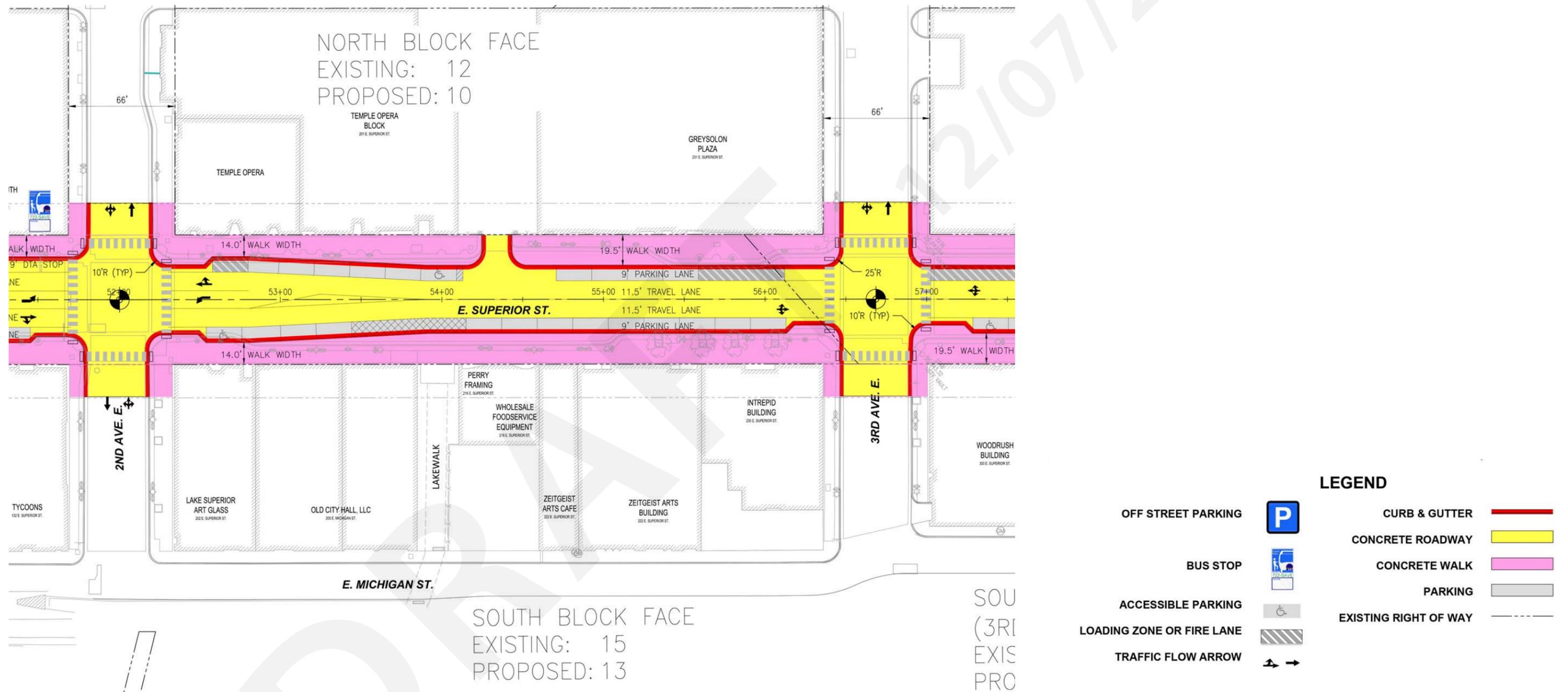


Figure 1.91 Proposed street layout between 2nd Avenue East and 3rd Avenue East.

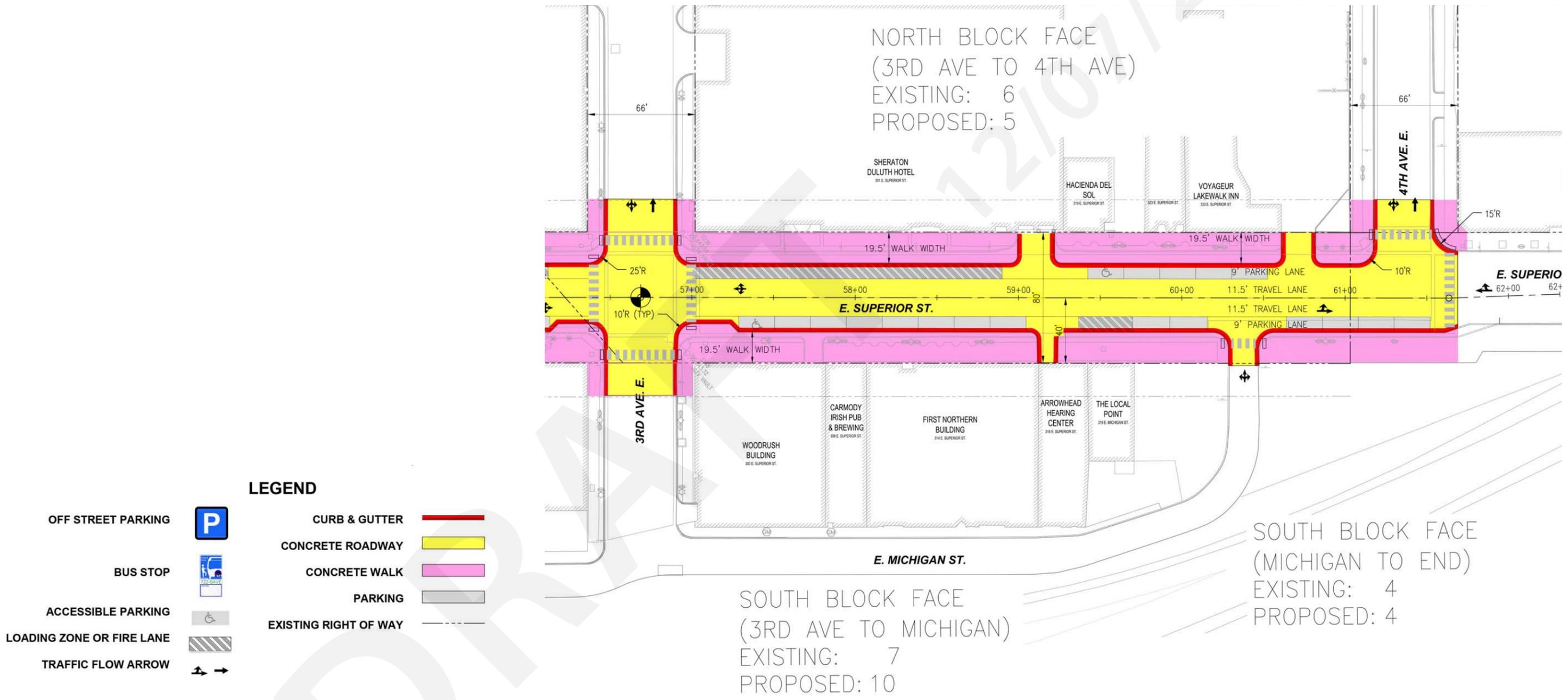


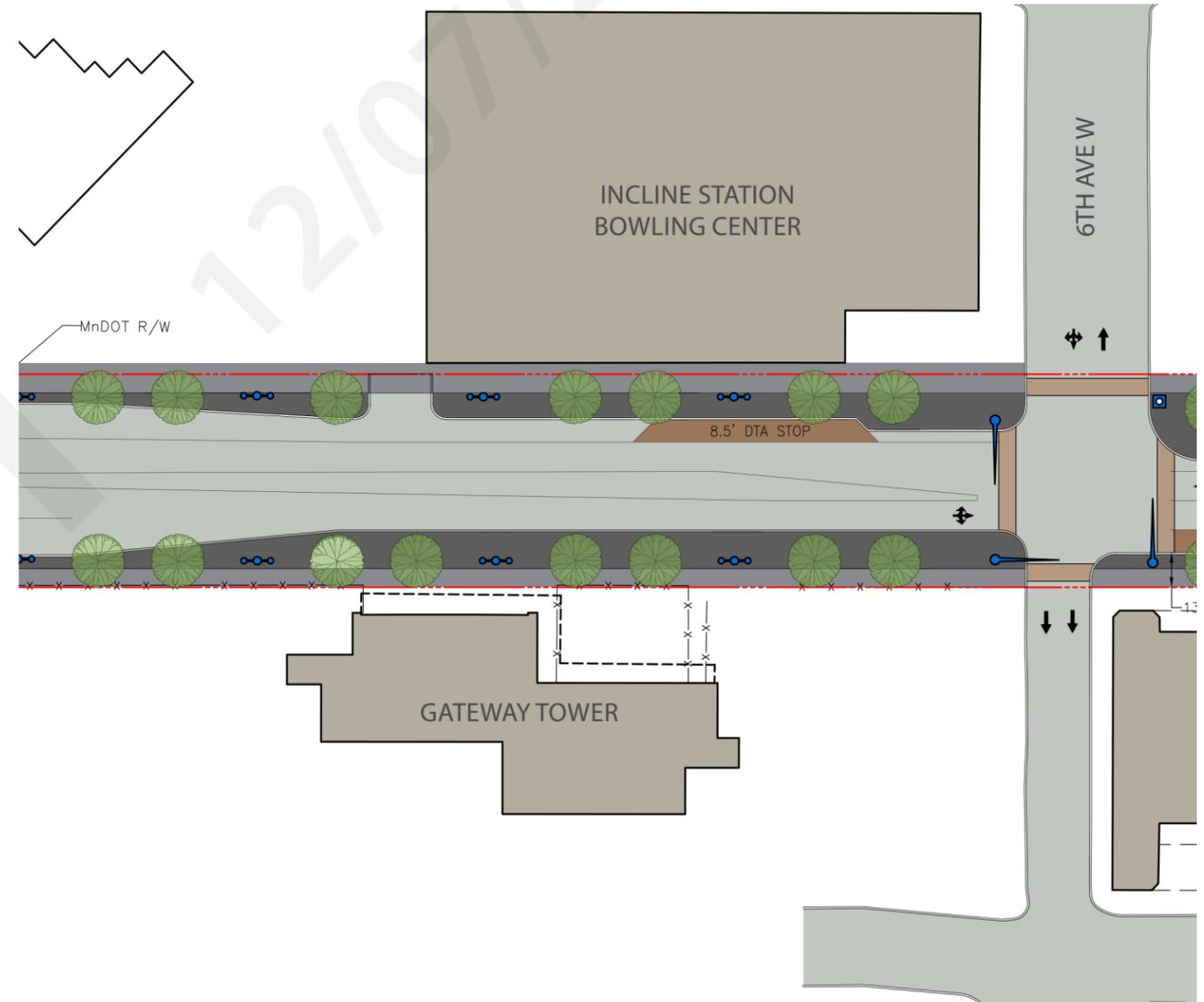
Figure 1.92 Proposed street layout between 3rd Avenue East and 4th Avenue East.

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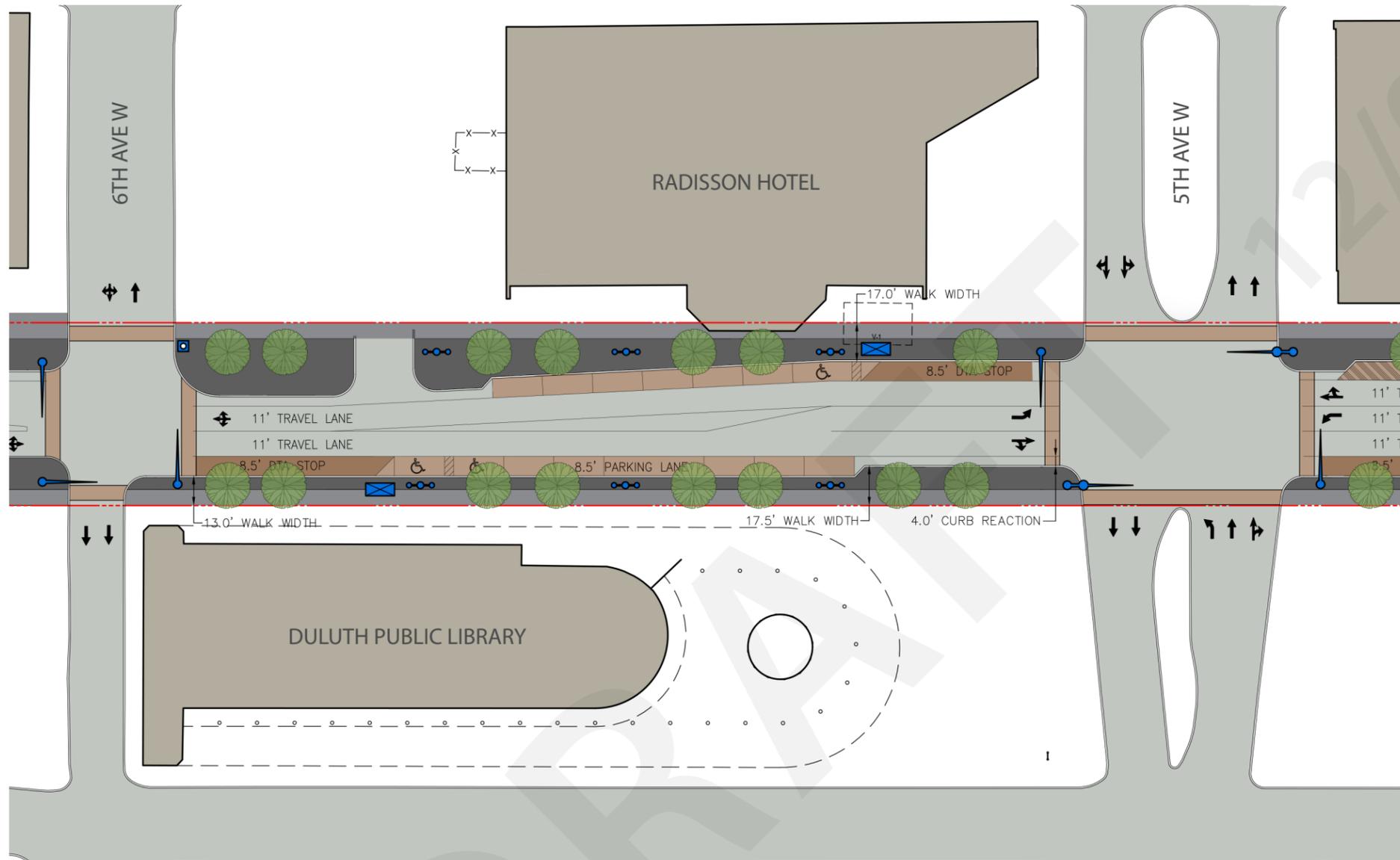
LEGEND

- - - RIGHT OF WAY LINE
- SIDEWALK PEDESTRIAN ZONE
- SIDEWALK AMENITY ZONE
- PARKING
- LOADING ZONE
- TRANSIT STOP
- SIGNAL POLE
- SIGNAL POLE W/ STREET LIGHT (DIAGONAL CORNERS)
- TRAFFIC SIGNAL (NO ARM)
- STREET LIGHT (DOUBLE LUMINAIRE)
- BANNER POLE
- TRANSIT SHELTER
- ✱ GATEWAY ELEMENT



AN ZONE
ZONE

Figure 1.93 Streetscape layout west of 6th Avenue West.



LEGEND

- - - RIGHT OF WAY LINE
- SIDEWALK PEDESTRIAN ZONE
- SIDEWALK AMENITY ZONE
- PARKING
- LOADING ZONE
- TRANSIT STOP
- SIGNAL POLE
- SIGNAL POLE W/ STREET LIGHT (DIAGONAL CORNERS)
- TRAFFIC SIGNAL (NO ARM)
- STREET LIGHT (DOUBLE LUMINAIRE)
- BANNER POLE
- TRANSIT SHELTER
- ✱ GATEWAY ELEMENT

Figure 1.94 Streetscape layout between 6th Avenue West and 5th Avenue West.

SCALE 1" = 30'
0 30 60 feet



LEGEND

- RIGHT OF WAY LINE
- SIDEWALK PEDESTRIAN ZONE
- SIDEWALK AMENITY ZONE
- PARKING
- LOADING ZONE
- TRANSIT STOP
- SIGNAL POLE
- SIGNAL POLE W/ STREET LIGHT (DIAGONAL CORNERS)
- TRAFFIC SIGNAL (NO ARM)
- STREET LIGHT (DOUBLE LUMINAIRE)
- BANNER POLE
- TRANSIT SHELTER
- GATEWAY ELEMENT

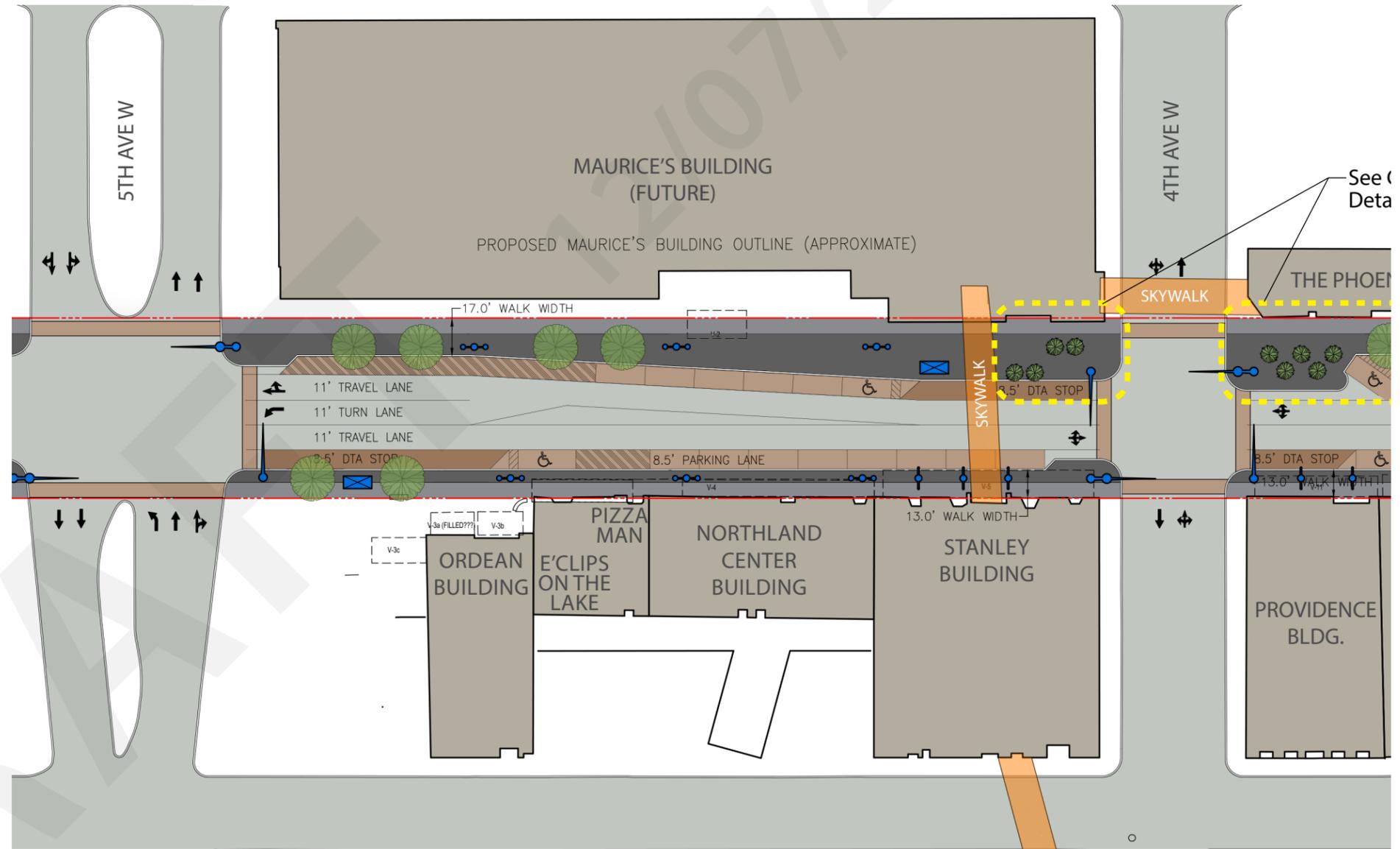
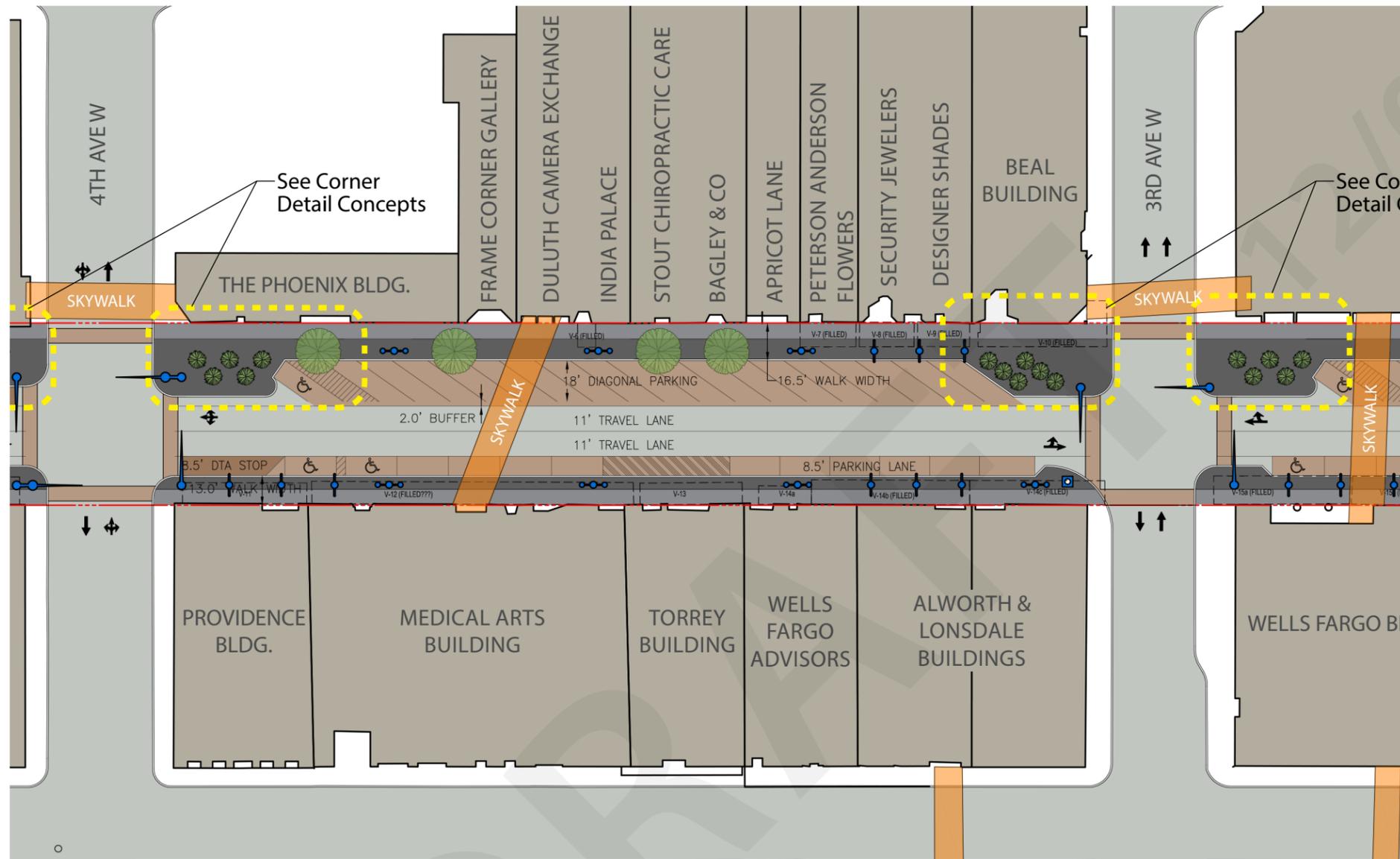


Figure 1.95 Streetscape layout between 5th Avenue West and 4th Avenue West.



LEGEND

- - - RIGHT OF WAY LINE
- SIDEWALK PEDESTRIAN ZONE
- SIDEWALK AMENITY ZONE
- PARKING
- LOADING ZONE
- TRANSIT STOP
- SIGNAL POLE
- SIGNAL POLE W/ STREET LIGHT (DIAGONAL CORNERS)
- TRAFFIC SIGNAL (NO ARM)
- STREET LIGHT (DOUBLE LUMINAIRE)
- BANNER POLE
- TRANSIT SHELTER
- ✱ GATEWAY ELEMENT

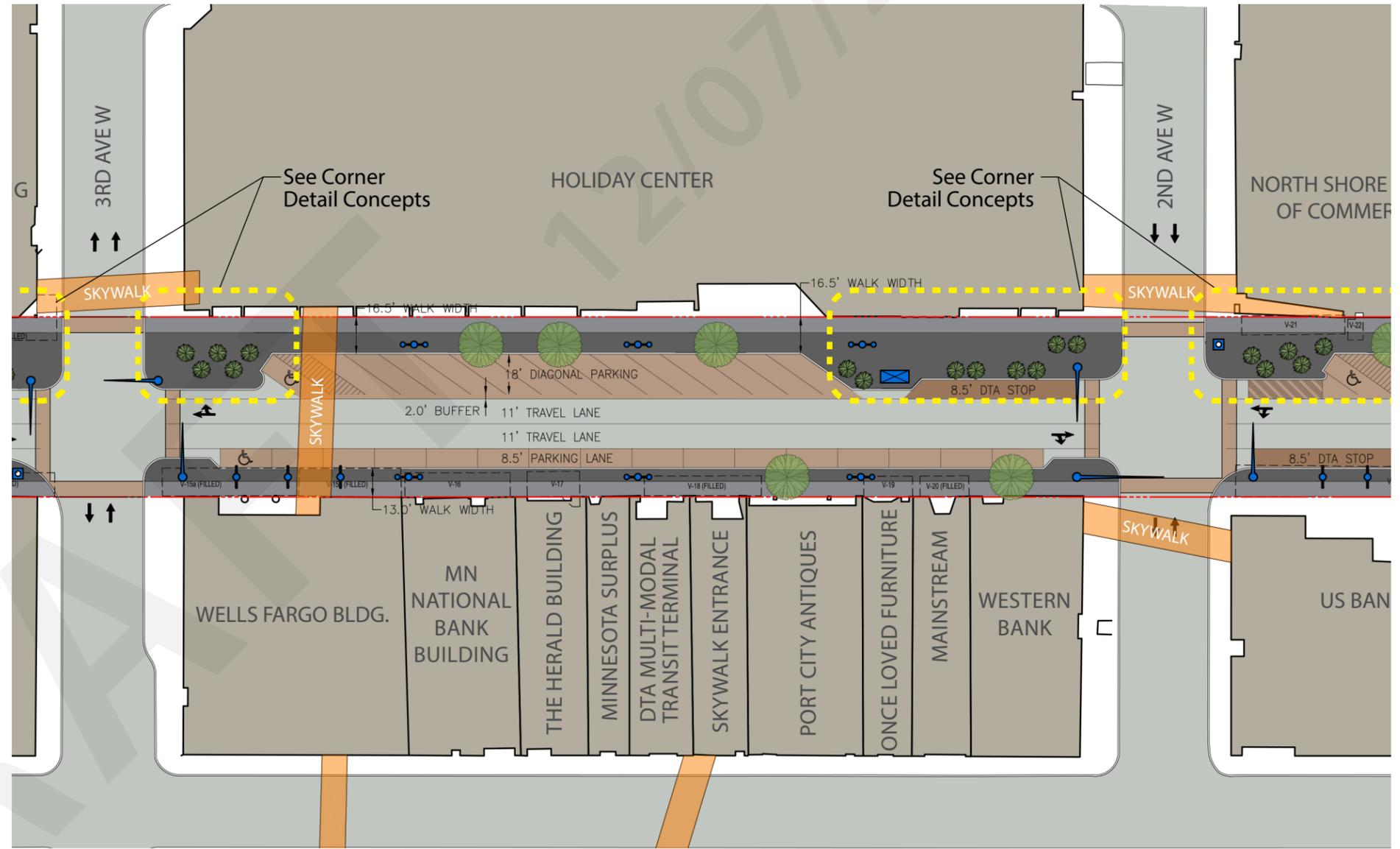
Figure 1.96 Streetscape layout between 4th Avenue West and 3rd Avenue West.

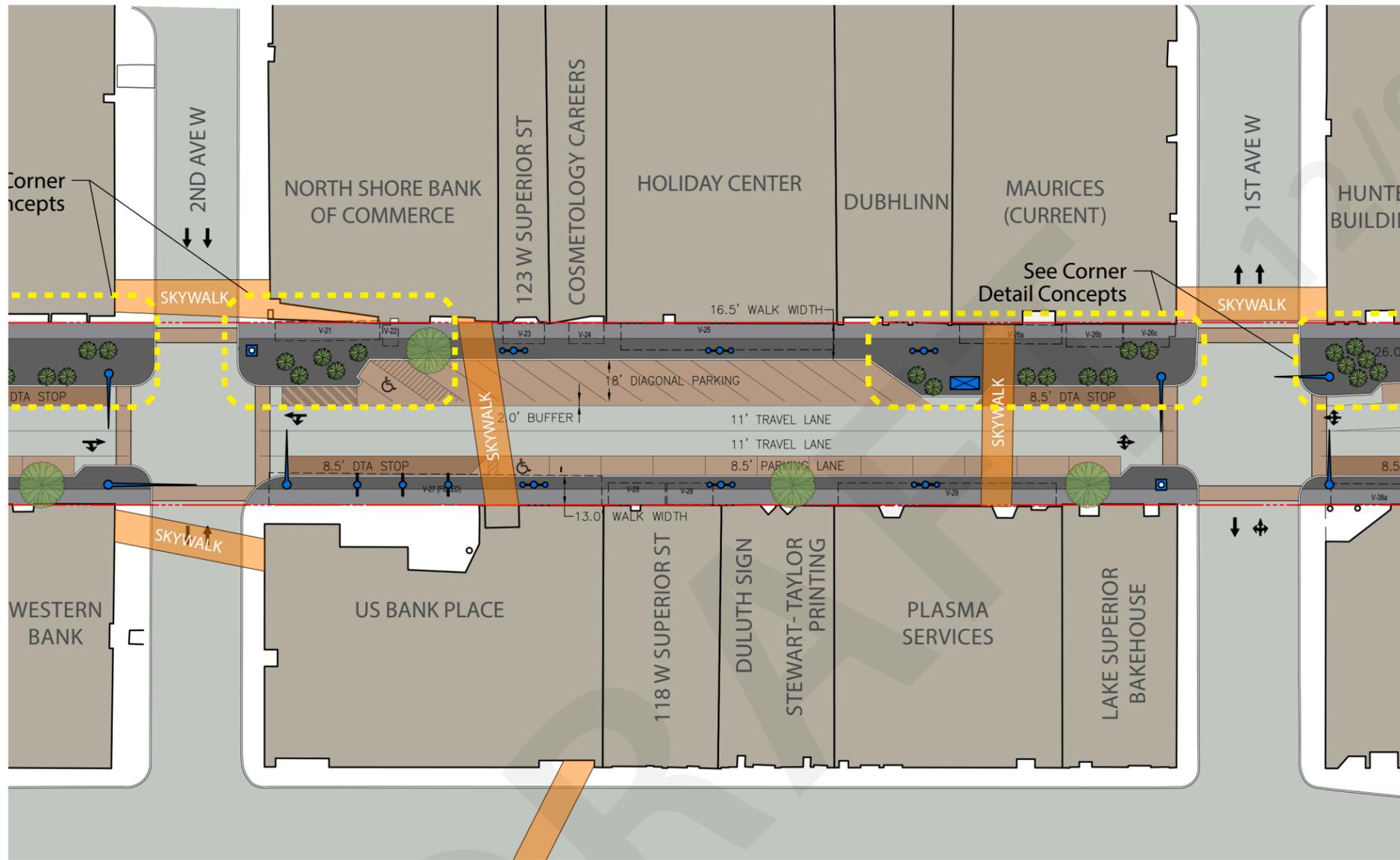
SCALE 1" = 30'
0 30 60 feet



LEGEND

- RIGHT OF WAY LINE
- SIDEWALK PEDESTRIAN ZONE
- SIDEWALK AMENITY ZONE
- PARKING
- LOADING ZONE
- TRANSIT STOP
- SIGNAL POLE
- SIGNAL POLE W/ STREET LIGHT (DIAGONAL CORNERS)
- TRAFFIC SIGNAL (NO ARM)
- STREET LIGHT (DOUBLE LUMINAIRE)
- BANNER POLE
- TRANSIT SHELTER
- GATEWAY ELEMENT





LEGEND

- - - RIGHT OF WAY LINE
- SIDEWALK PEDESTRIAN ZONE
- SIDEWALK AMENITY ZONE
- PARKING
- LOADING ZONE
- TRANSIT STOP
- SIGNAL POLE
- SIGNAL POLE W/ STREET LIGHT (DIAGONAL CORNERS)
- TRAFFIC SIGNAL (NO ARM)
- STREET LIGHT (DOUBLE LUMINAIRE)
- BANNER POLE
- TRANSIT SHELTER
- ✱ GATEWAY ELEMENT

Figure 1.98 Streetscape layout between 2nd Avenue West and 1st Avenue West.

SCALE 1" = 30'
0 30 60 feet



LEGEND

- - - RIGHT OF WAY LINE
- SIDEWALK PEDESTRIAN ZONE
- SIDEWALK AMENITY ZONE
- PARKING
- LOADING ZONE
- TRANSIT STOP
- SIGNAL POLE
- SIGNAL POLE W/ STREET LIGHT (DIAGONAL CORNERS)
- TRAFFIC SIGNAL (NO ARM)
- STREET LIGHT (DOUBLE LUMINAIRE)
- BANNER POLE
- TRANSIT SHELTER
- GATEWAY ELEMENT

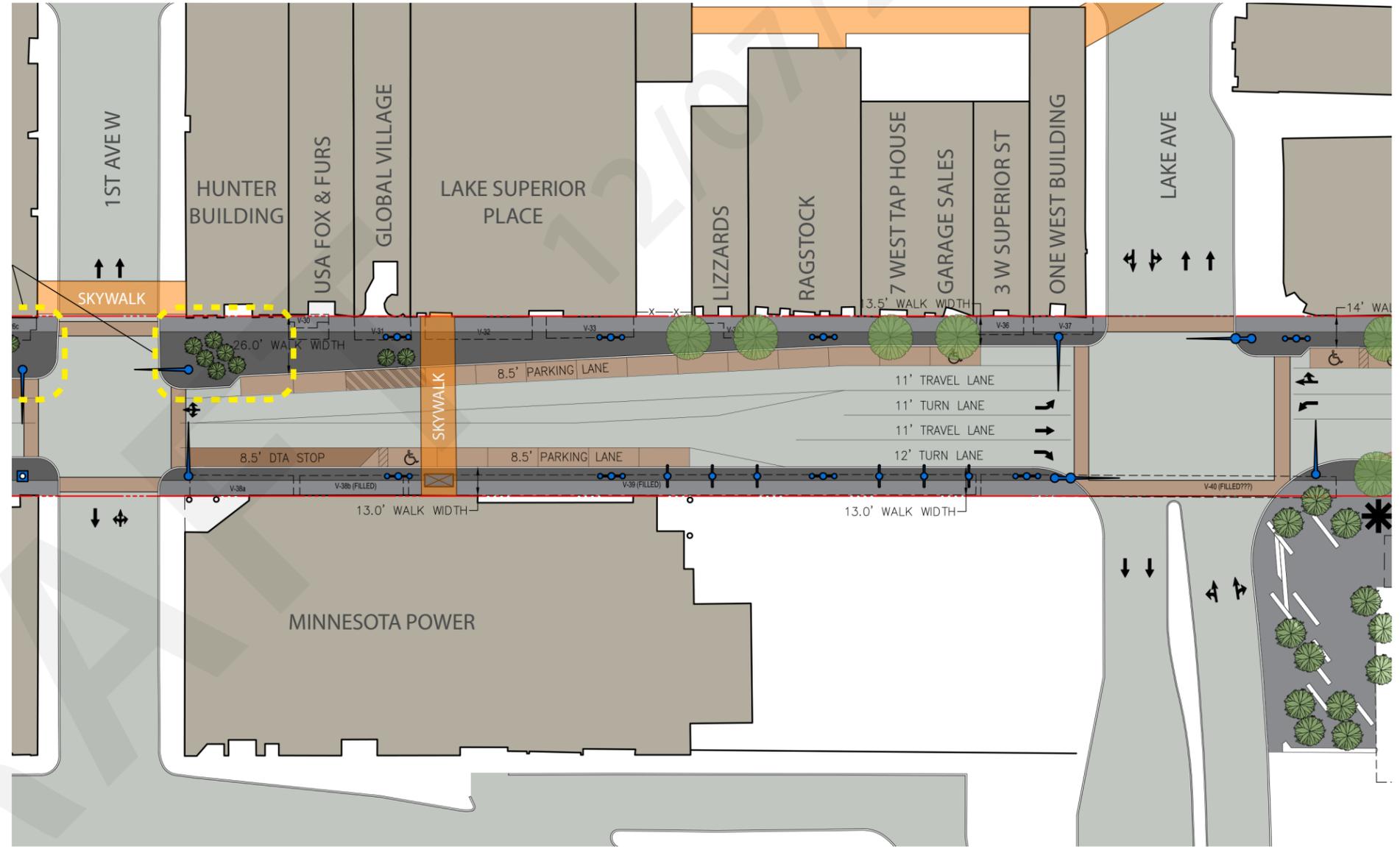
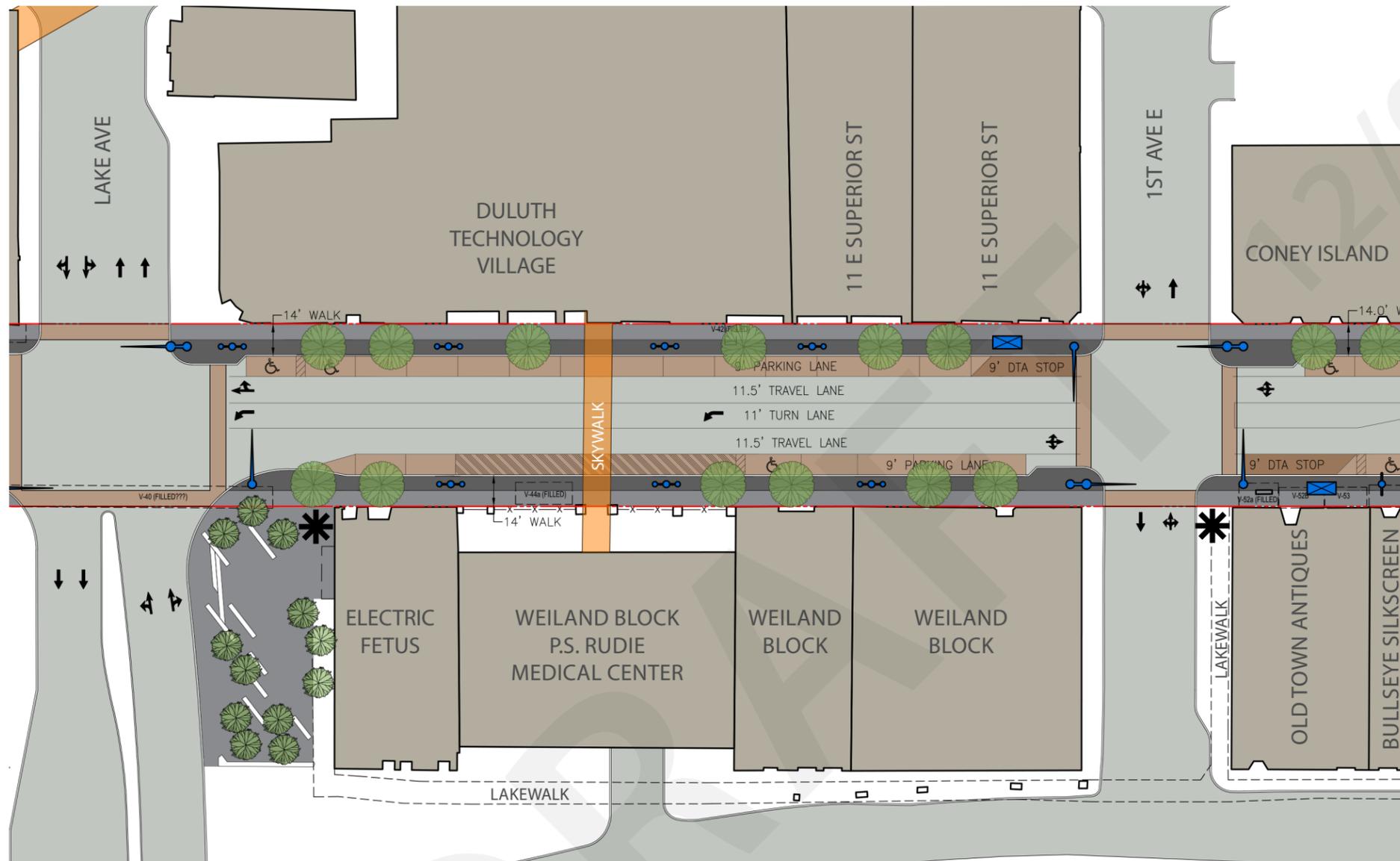


Figure 1.99 Streetscape layout between 1st Avenue West and Lake Avenue.



LEGEND

- - - RIGHT OF WAY LINE
- SIDEWALK PEDESTRIAN ZONE
- SIDEWALK AMENITY ZONE
- PARKING
- LOADING ZONE
- TRANSIT STOP
- SIGNAL POLE
- SIGNAL POLE W/ STREET LIGHT (DIAGONAL CORNERS)
- TRAFFIC SIGNAL (NO ARM)
- STREET LIGHT (DOUBLE LUMINAIRE)
- BANNER POLE
- TRANSIT SHELTER
- ✱ GATEWAY ELEMENT

Figure 1.100 Streetscape layout between Lake Avenue and 1st Avenue East.

SCALE 1" = 30'
0 30 60 feet



LEGEND

- RIGHT OF WAY LINE
- SIDEWALK PEDESTRIAN ZONE
- SIDEWALK AMENITY ZONE
- PARKING
- LOADING ZONE
- TRANSIT STOP
- SIGNAL POLE
- SIGNAL POLE W/ STREET LIGHT (DIAGONAL CORNERS)
- TRAFFIC SIGNAL (NO ARM)
- STREET LIGHT (DOUBLE LUMINAIRE)
- BANNER POLE
- TRANSIT SHELTER
- GATEWAY ELEMENT

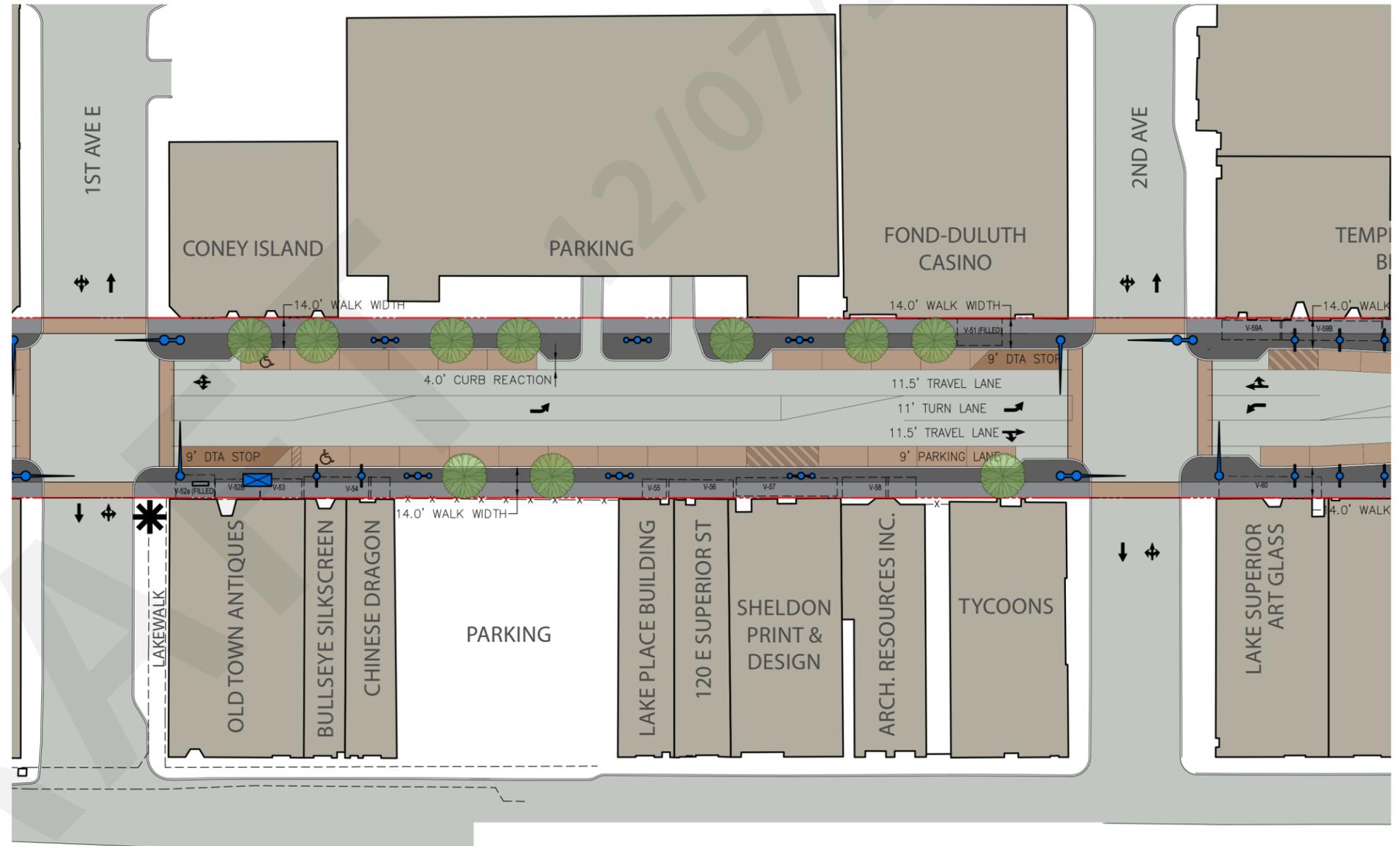
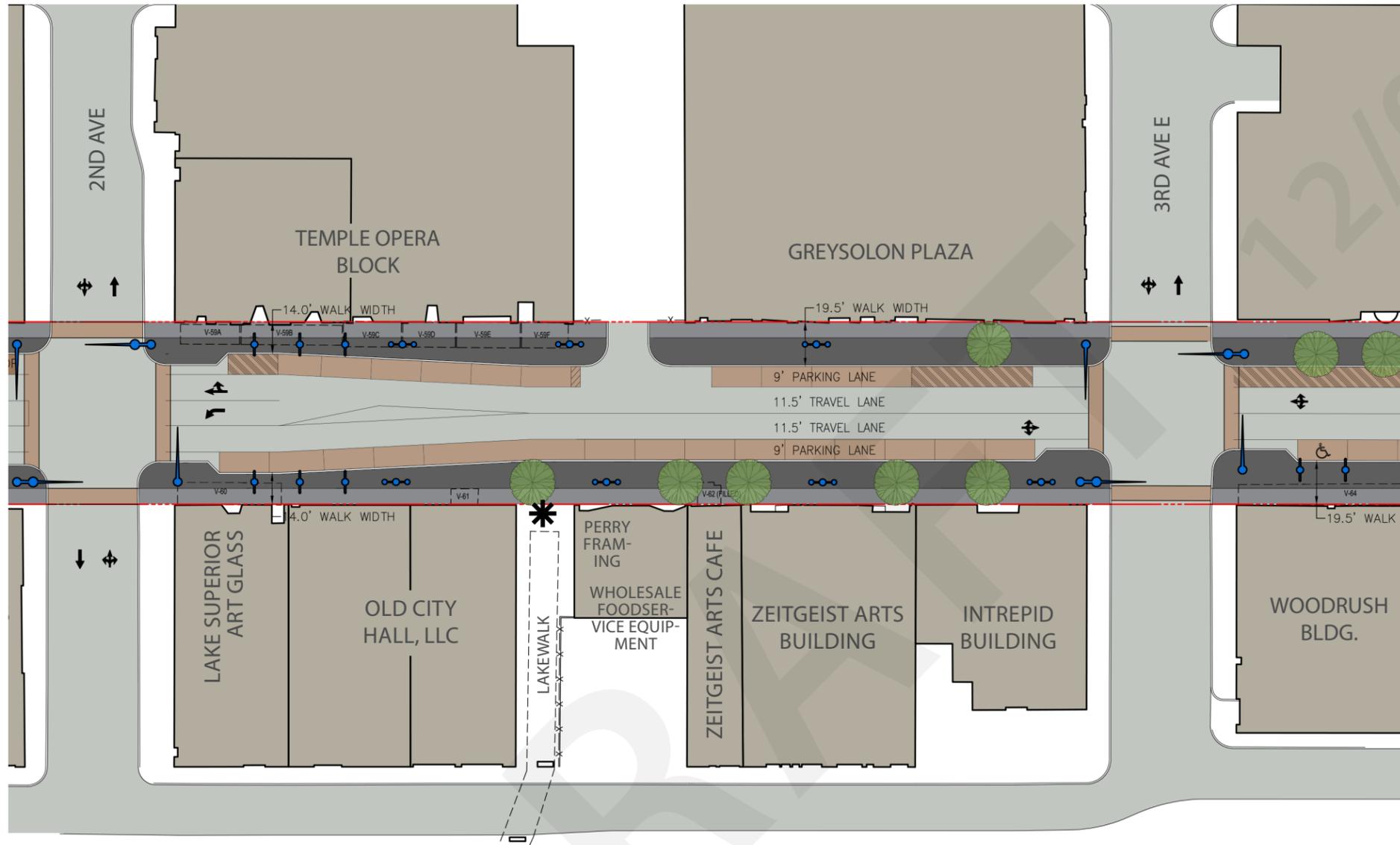


Figure 1.101 Streetscape layout between 1st Avenue East and 2nd Avenue East.



LEGEND

- RIGHT OF WAY LINE
- SIDEWALK PEDESTRIAN ZONE
- SIDEWALK AMENITY ZONE
- PARKING
- LOADING ZONE
- TRANSIT STOP
- SIGNAL POLE
- SIGNAL POLE W/ STREET LIGHT (DIAGONAL CORNERS)
- TRAFFIC SIGNAL (NO ARM)
- STREET LIGHT (DOUBLE LUMINAIRE)
- BANNER POLE
- TRANSIT SHELTER
- ✱ GATEWAY ELEMENT

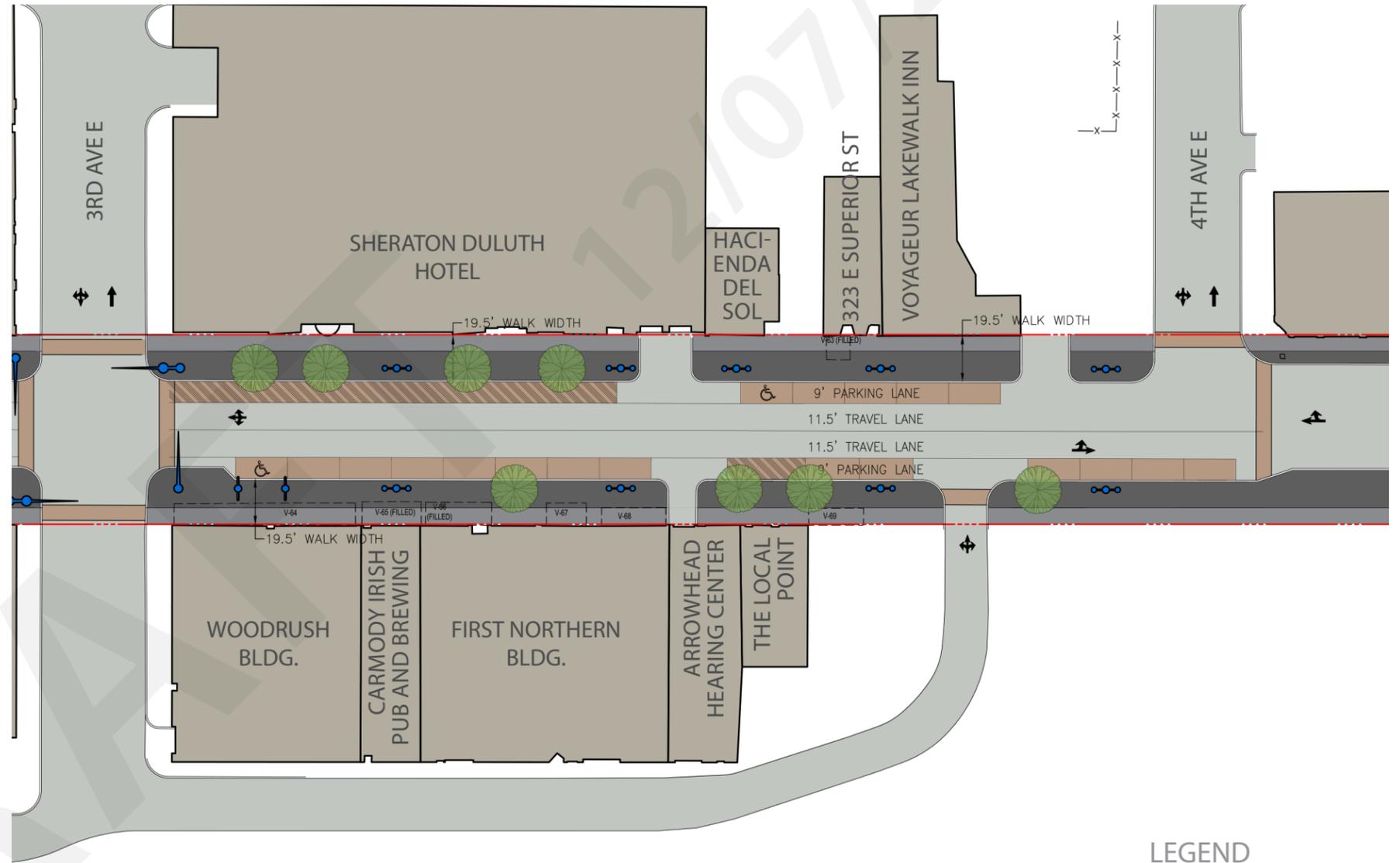
Figure 1.102 Streetscape layout between 2nd Avenue East and 3rd Avenue East.

SCALE 1" = 30'
0 30 60 feet



LEGEND

- - - RIGHT OF WAY LINE
- SIDEWALK PEDESTRIAN ZONE
- SIDEWALK AMENITY ZONE
- PARKING
- LOADING ZONE
- TRANSIT STOP
- SIGNAL POLE
- SIGNAL POLE W/ STREET LIGHT (DIAGONAL CORNERS)
- TRAFFIC SIGNAL (NO ARM)
- STREET LIGHT (DOUBLE LUMINAIRE)
- BANNER POLE
- TRANSIT SHELTER
- GATEWAY ELEMENT



LEGEND

- - - RIGHT OF WAY LINE

Figure 1.103 Streetscape layout to the east of 3rd Avenue East.

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Attachments

- » Topographic and Utility Survey
- » Geotechnical Evaluation Report
- » Phase I Environmental Evaluation
- » Phase II Environmental Evaluation
- » Response Action Plan/
Construction Contingency Plan
- » Traffic Study
- » Traffic Signal Warrants Analysis Memo

The following attachments to the Design Summary Document are available for download at the City of Duluth's project web site:

<http://www.duluthmn.gov/planning/superior-street/>

1. Superior Street Topographic and Utility Survey, (October 2013), by LHB. 38 pages.
2. Geotechnical Evaluation Report, (November 2015), by Braun Intertec, 98 pages.
3. Environmental Evaluation Report, (January 2015), by Barr Engineering Company. 1670 pages.
4. Phase II Investigation Results - Superior Street Reconstruction Corridor, (February 2015), by Barr Engineering. 236 pages.
5. Response Action Plan/Construction Contingency Plan - Superior Street Reconstruction, (December 2015), by Barr Engineering Company. xx pages.
6. Superior Street Reconstruction Traffic Study, (December 2013)m by SRF Consulting Group. 13 pages.
7. Traffic Signal Warrants Analysis, (December 2013), by SRF Consulting Company. 4 pages.

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