



Des Moines WA
The Waterland City

South 223rd Green Street Study Report
April 2024

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PREFACE

An important purpose of this preliminary study report is to act as a guiding document for decision making and future project development along the South 223rd Street corridor. The report includes the results of the project team's study, as well as preliminary design concepts. It is intended to be a living document that will be updated as City projects move forward to guide adjacent new private redevelopments and capital project improvements, and for grant funding support. It provides the design context, goals, objectives, supporting analyses, and stakeholder input for placemaking design decisions for corridor.

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Looking east up S. 223rd St. from 7th Ave S.



Des Moines Marina bulkhead



Overlook I Park



Farmers Market (Source: Des Moines Farmers Market)



Historic Lighthouse Lounge building



Harbormaster Building at Des Moines Marina

PROJECT DESCRIPTION

The South 223rd Green Street Study focuses on the segment of South 223rd Street between Marine View Drive and Cliff Avenue South. This report includes preliminary design concepts to create a “green” corridor and pedestrian promenade in Downtown Des Moines, informed by stormwater analysis, cultural resource monitoring, and stakeholder engagement. Included are the following major project components:

- **Street layout** for South 223rd Street with an emphasis on creating a pedestrian and environmentally friendly promenade that includes additional planting areas and stormwater quality features to provide an inviting connection between downtown and the waterfront via the future Marina Steps.
- **Stormwater analysis** of the South 223rd Street corridor and associated stormwater drainage basin to confirm the feasibility and sizing of potential stormwater features, such as a large bioswale.
- **Stakeholder outreach** (including a wide range of interested individuals and groups), City Council presentations, a project web site for information sharing, and solicitation of public feedback through an online survey to identify a placemaking theme.
- **Coordination with the ongoing Marina District Redevelopment** efforts, including the current design of the future Marina Steps.



Birds' eye view of Marina District, S. 223rd St. project area highlighted in red



Looking west on S. 223rd St. from Marine View Dr.



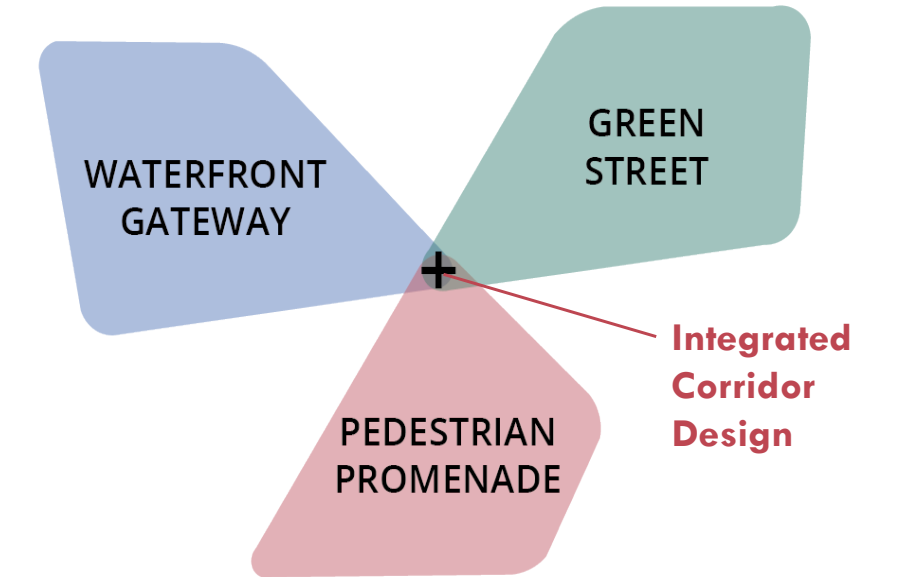
Looking west from Overlook I Park

PROJECT GOALS & OBJECTIVES

The primary goals of this study are to create an **inviting waterfront gateway** that better connects the Marine View Drive retail core and residential areas with the Marina and waterfront, while offering an **enhanced pedestrian experience** along South 223rd Street to the future Marina Steps and providing **improved stormwater quality** in downtown.

The project team recognizes the future Marina Steps project as a catalyst to the success of the Marina District revitalization. This study identifies the best way to seamlessly connect to the Marina Steps with improvements to make the South 223rd Street connection to the waterfront more inviting and safer for pedestrians. The study also proposes new green stormwater infrastructure that, combined with new stormwater infrastructure at the Marina Steps, will reduce the amount of pollutants entering Puget Sound via runoff from the North Downtown Basin and make stormwater treatment an aesthetically attractive and environmentally friendly feature of the streetscape.

In addition, the South 223rd Street study will identify new streetscape design standards for quality downtown placemaking. It considers streetscape elements that are transferable to future downtown revitalization projects to create a cohesive and inviting place for residents and visitors.



3 attributes of the South 223rd Street Corridor Design:

- Acts as gateway to the waterfront
- Green stormwater quality and landscape features
- Inviting and friendly walkway to the Marina Steps

Figure: Integrated Corridor Design Attributes

PROJECT CONTEXT

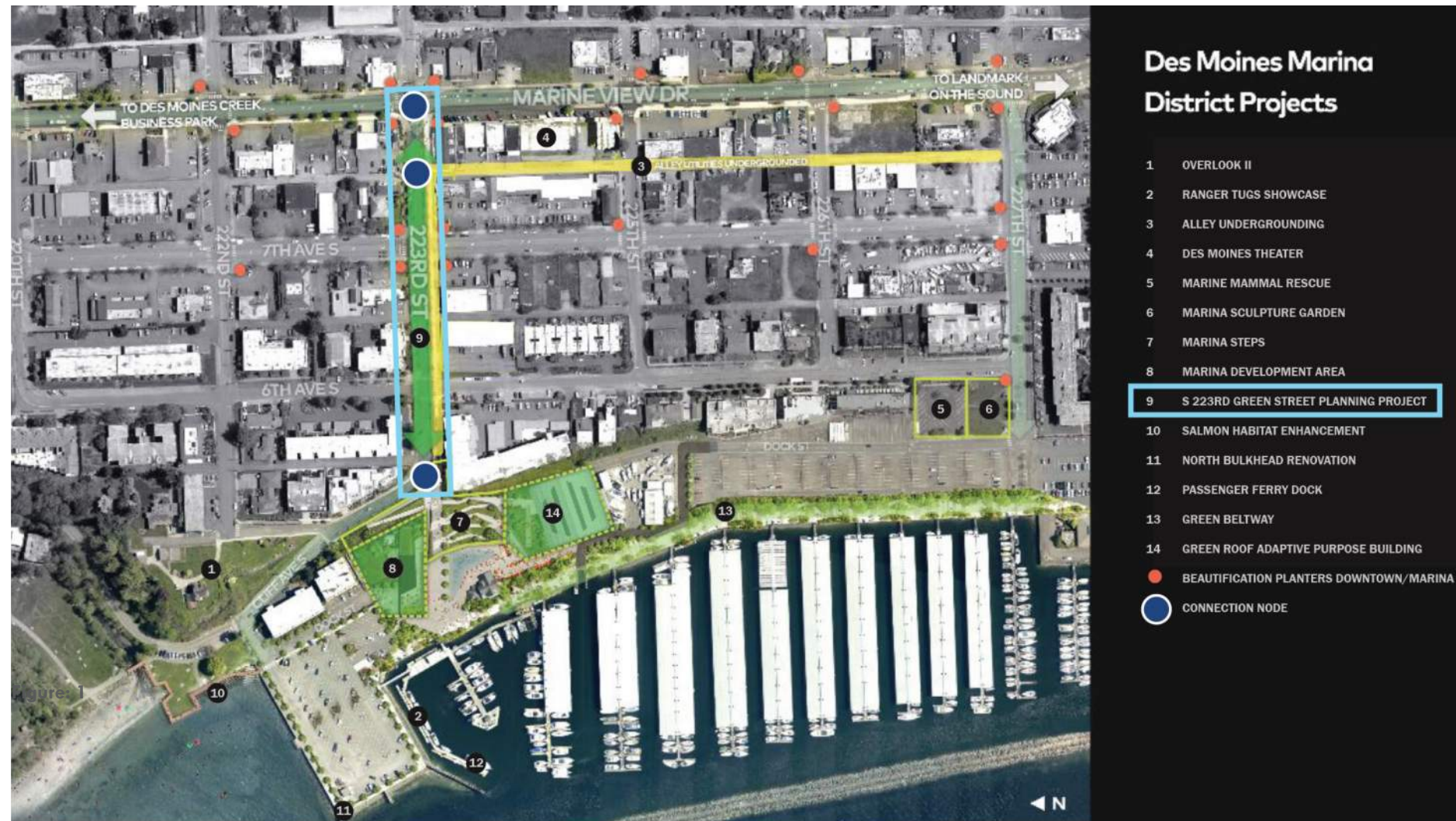


Figure: The South 223rd Street study area in relation to Marina District projects (Map Source: Marina Steps project / Skylab)

EXISTING CONDITIONS

The existing conditions along South 223rd Street vary along the corridor. From Marine View Drive to 7th Avenue South, there is parallel parking on the north side, angle parking on the south side, sidewalks with some landscaping, underground utilities, and multiple driveways for some properties. From 7th Avenue South to Cliff Avenue South, there is informal parking, wide shoulders, incomplete sidewalks, overhead utilities, and several access points to adjacent properties.

There are a number of existing conditions that present opportunities for improvement:

Existing Conditions:

- Private improvements at the property line that may require transitions/mediation for access
- Overhead utility infrastructure that interferes with views
- Mismatched and disconnected ROW improvements
- Formal and informal parking along the roadway
- Inconsistent pedestrian and bicycle facilities
- Vehicular/pedestrian/business access to adjacent properties that must be maintained along with future improvements

Opportunities:

- Restore private improvements along the property line to better condition
- Improve sight lines and aesthetic view towards the waterfront and Puget Sound by undergrounding overhead utilities
- Provide consistent improvements with a cohesive theme in ROW
- Formalize and strategically locate parking along the corridor
- Provide connectivity for pedestrians, cyclists, and vehicles to waterfront amenities
- Consolidate or maintain property access to minimize vehicle / pedestrian conflict points



Looking west from S. 223rd St. at Marine View Dr.



Looking west from S. 223rd St. at 7th Ave S.



Looking west from S. 223rd St. at 6th Ave S.

SITE INVENTORY

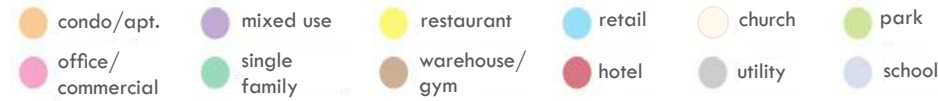
The Marina District

The Marina District includes Downtown, the Des Moines Marina, and Des Moines Beach Park. It is the historic center and community hub for the City of Des Moines.

The District has a diverse mix of land uses and businesses. As described by Destination Des Moines, the Marina District is “a waterfront village, home to restaurants, unique shops, and other retail and services to be explored in this pedestrian-friendly neighborhood.” South 223rd Street lies at the center of the Marina District and provides a vital connection from the retail core along Marine View Drive and surrounding residential areas to waterfront destinations, such as the Des Moines Marina, Farmers Market, Des Moines Beach Park, and the future Marina Steps.

Access to Waterfront

Visitors driving to the waterfront use South 223rd Street as the primary route, with multiple north and south connections through the downtown street grid. Drivers access Cliff Avenue from South 223rd or South 222nd Street and continue to the waterfront. Transit users have stops at South 223rd Street on Marine View Drive (Routes 165 & 635). Pedestrians and cyclists have a wider array of access connections including neighborhoods north of Des Moines Creek, trails along Des Moines Creek, and from S. Marina Park/ South 227th Street. At South 223rd Street, this study proposes a larger scale, inviting “promenade” to connect with downtown condos, apartments, and businesses, as well as to the neighborhoods located east of Marine View Drive that are within walking distance.



The downtown area within the Marina District has a wide range of land uses, housing, and businesses. *Data source: KCGIS Center*



Figures: Downtown land uses within the Marina District

CULTURAL RESOURCES SURVEY

Ongoing Cultural Resources Survey

The City recognizes the history of the Des Moines waterfront area as traditional fishing lands of the Muckleshoot and Duwamish Tribes. Therefore, the City and project team will conduct a thorough cultural resources survey as part of the project and work in partnership with local tribal representatives. As part of the cultural resources survey process, the following activities have been completed:

- Department of Archaeology and Historic Preservation (DAHP) literature and records search;
- Background research conducted at the Des Moines Historical Society;
- Cultural resources field survey of the corridor;
- Cultural resources monitoring (negative results) of the geotechnical boring along 223rd Street (local tribes were invited to monitor, but no tribal representatives attended);
- Built environment analysis/evaluations have been prepared for five properties;
- Tribal consultation for the Project when appropriate; and
- Final report approval by DAHP

In addition to the final cultural resources report, the information gathered through the survey process was incorporated into the preliminary roadway and stormwater design for the corridor.



Geotechnical boring along South 223rd Street

STORMWATER ANALYSIS - OVERVIEW



Des Moines Marina, Des Moines Creek, and Puget Sound Image source: City of Des Moines

Stormwater Analysis Process

Following the cultural resource and soil surveys, a thorough stormwater analysis was conducted as part of the South 223rd Street study. The results of this analysis determined the proportion of the tributary basin that could feasibly be treated within the South 223rd Street project area, as well as the size and type of green stormwater infrastructure (bioretention swales) required to treat the forecasted runoff volumes to environmental standards.

The stormwater analysis process included:

- An analysis of the South 223rd Street tributary basin and existing stormwater infrastructure
- Soil profiles for the South 223rd Street project area
- Hydrologic modeling to determine average annual runoff volumes
- Calculations and delineation of the North Downtown Basin for stormwater treatment
- Sizing and preliminary design for bioretention swales (bioswales) necessary to treat North Downtown Basin stormwater runoff volumes

The results of the stormwater analysis are summarized in the following pages and were incorporated into the preliminary design layout for South 223rd Street. The complete stormwater analysis is provided in the Conceptual Technical Information Report (TIR) located in Appendix E.

STORMWATER ANALYSIS - TRIBUTARY BASIN

Tributary Basin Analysis

The City of Des Moines has identified two primary stormwater improvement objectives:

1. Satisfying all stormwater core requirements, including water quality treatment, triggered by the redevelopment of South 223rd Street.
2. Providing regional water quality treatment for tributary basin area or subset to the extent feasible.

Regional basin analysis identifies 70.43 acres of untreated ROW and a variety of single-family, multi-family, park, and commercially-zoned parcels that drain to South 223rd Street.

All tributary stormwater runoff within this basin converges to a 30" concrete conveyance pipe that flows westward down the center of South 223rd Street, then continues westward down the adjacent hill slope and discharges directly to Puget Sound at the Des Moines Marina.

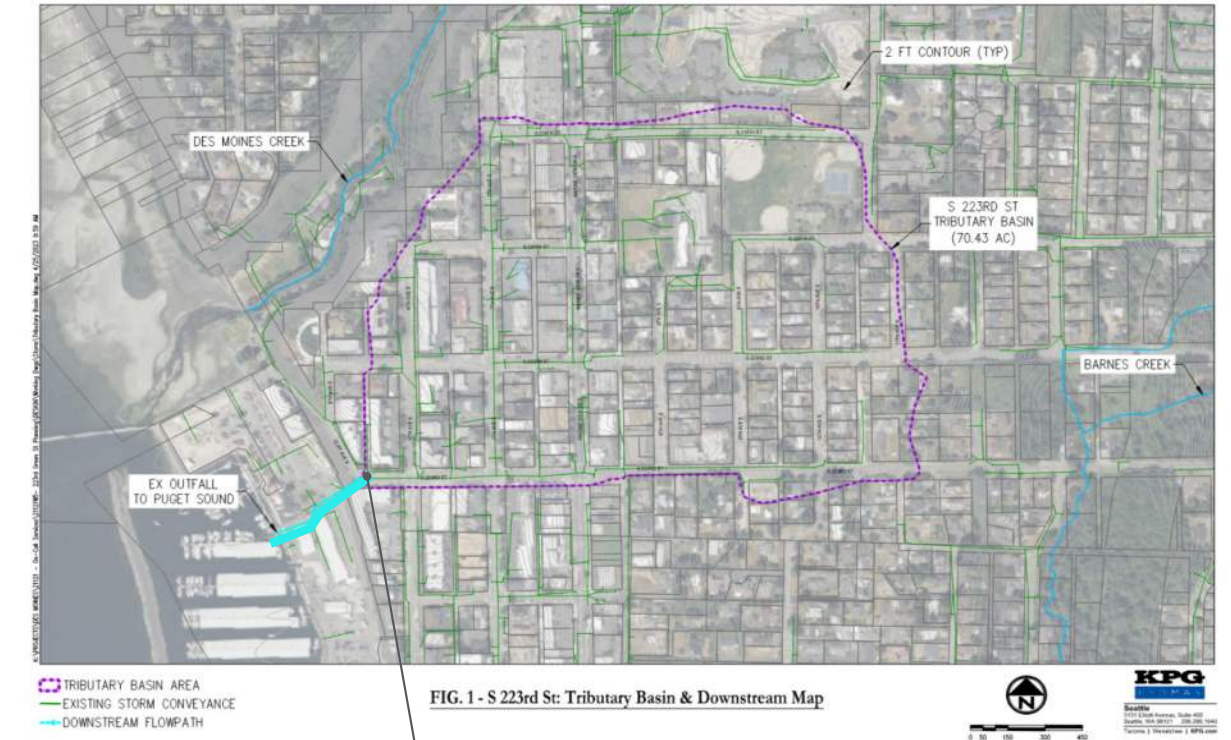


FIG. 1 - S 223rd St: Tributary Basin & Downstream Map

Collected and conveyed to South 223rd Street, then conveyed to Puget Sound

STORMWATER ANALYSIS - SOIL PROFILE

Tributary Basin Soil Analysis

A review of the soils within the tributary basin was made using available USGS Mapping resources. The soils map indicates that Glacial Till (Qvt) soils are underlain by Recessional Outwash (Qvr) deposits throughout the Tributary Basin.

In addition to soil characterization, USGS mapping provides a valuable depiction of hydrologic patterns within the South 223rd Street Tributary Basin. The majority of the larger regional stormwater runoff area, beyond the Tributary Basin, appears to concentrate within Des Moines Creek and Barnes Creek, whose channelization defines the landscape to the north, east, and south of the City's downtown core. Historic flow patterns and subsequent erosive action have created an isolated topographic high within the City which is bisected by South 223rd Street.

The presence of well-defined channel features within the Des Moines Creek and Barnes Creek areas suggests that most regional surface water runoff is located within these creeks rather than collected in the South 223rd Street conveyance system. While the South 223rd Street Tributary Basin is capable of producing significant runoff, it is insufficient to maintain year-round base flow. This is confirmed in the following preliminary Hydrologic Modelling (see next page).

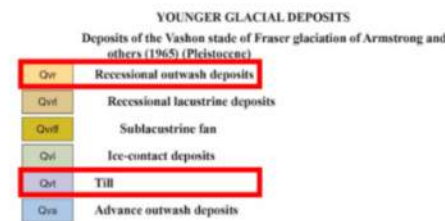
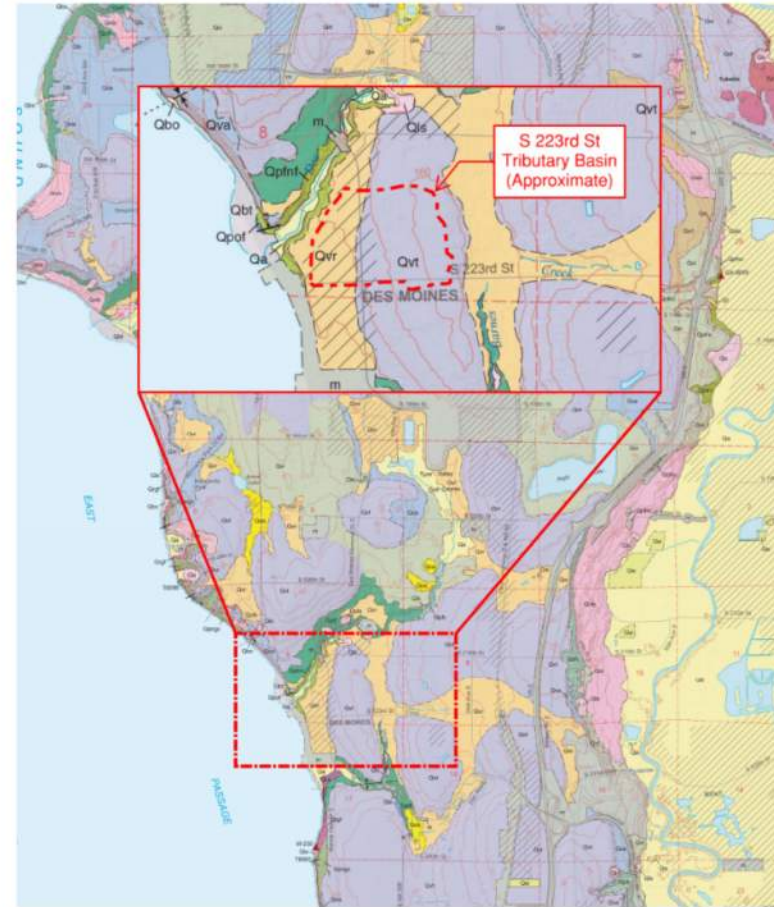


Figure: Basin Soils

STORMWATER ANALYSIS - AVERAGE ANNUAL RUNOFF VOLUMES

Hydrologic Modeling

Preliminary hydrologic modeling of the South 223rd Street Tributary Basin confirms that stormwater runoff flows are minimal throughout the summer months (May through September) when pedestrian presence is greatest. The idea of visually expressing stormwater flow will only be achievable during the early spring, late fall, and winter months, when pedestrian activity is greatly diminished.

Despite the lack of sufficient year-round flow to achieve a consistently visible natural watercourse aesthetic, it remains the City's desire to feature surface water expression prominently as part of the proposed streetscape improvements. Rather than design for visual water flow, the idea is to use rain garden vegetation in bioretention swales (a.k.a. bioswales) that are integrated with pedestrian promenade improvements along the corridor. These landscape areas will draw focus to the City's regional water quality goals, while supporting the green street concept with both environmental and aesthetic benefits.

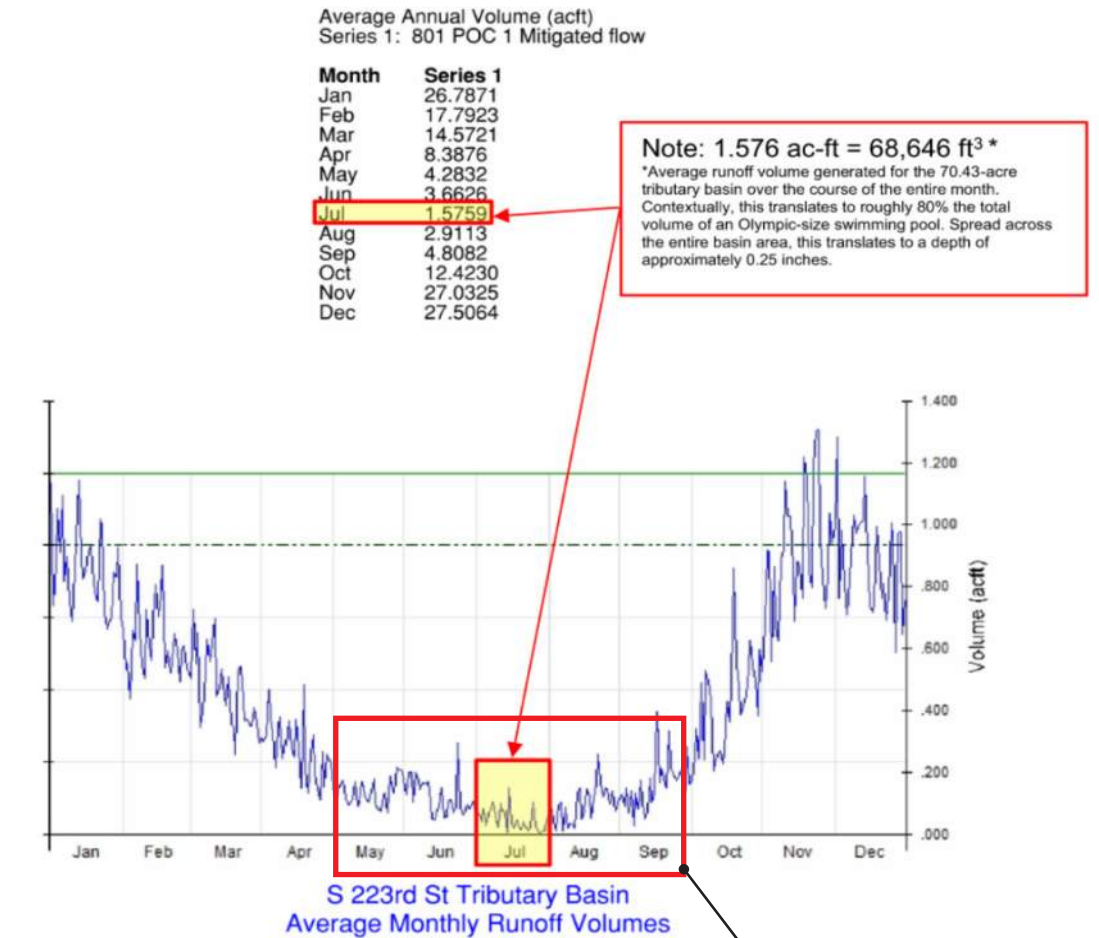


Figure: Annual Basin Flow

STORMWATER ANALYSIS - NORTH DOWNTOWN BASIN

Proposed Water Quality Treatment Basin

The proposed bioretention swales were designed in accordance with King County and Department of Ecology water quality treatment standards, with the goal of fully treating runoff associated with both the project site and largest possible tributary basin area. Preliminary design calculations indicate that the proposed bioretention swale has sufficient capacity to fully mitigate both the immediate project area (S. 223rd St. Basin) and an additional 29.58 acres of tributary area, referred to as the North Downtown Basin. Note: the North Downtown Basin is a subset of the Tributary Basin.

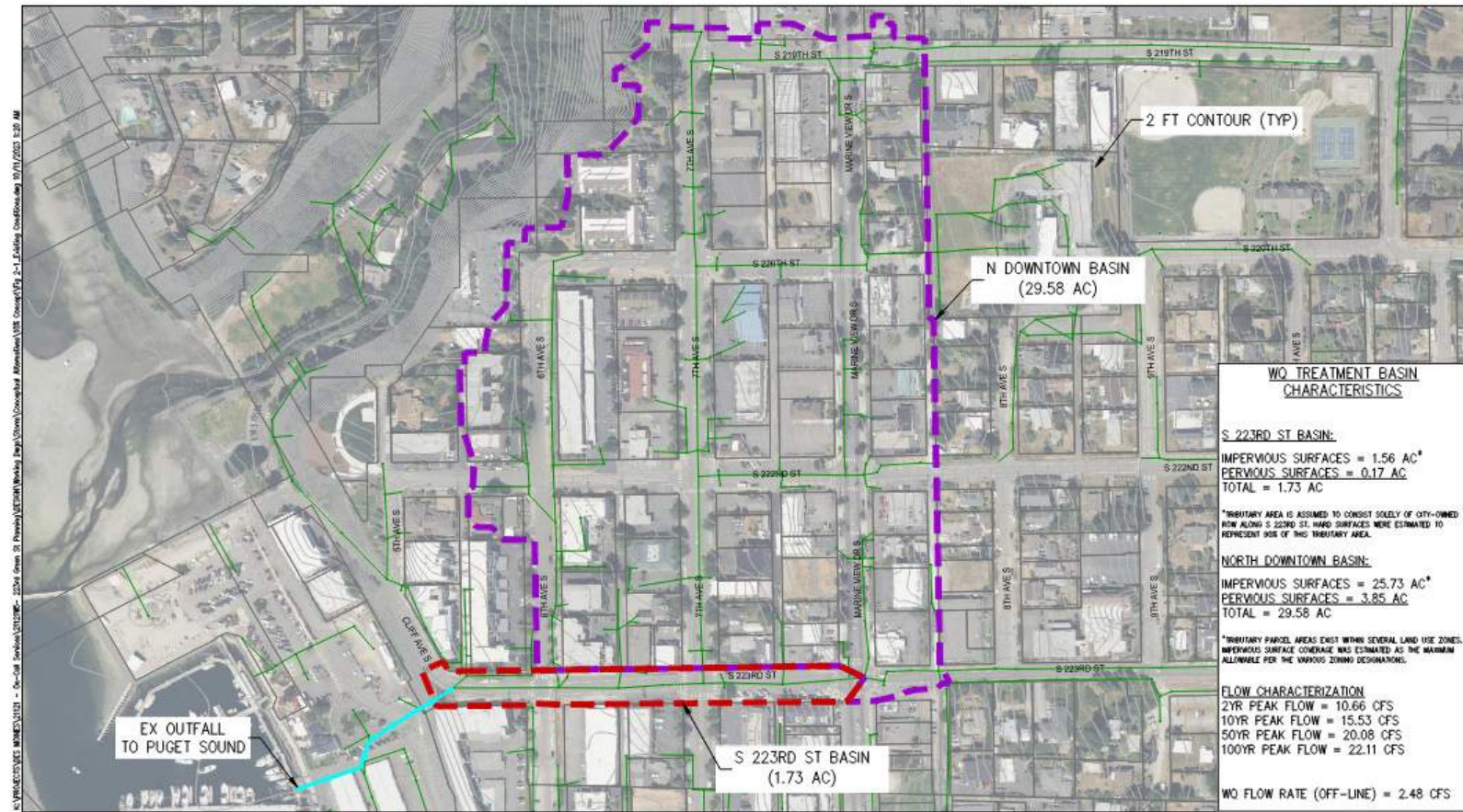
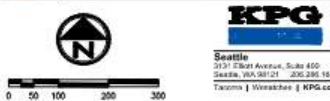


FIG. 2: PROPOSED WQ TREATMENT BASINS



STORMWATER ANALYSIS - BIOSWALE FOR NORTH DOWNTOWN BASIN

Proposed Bioretention Swale

The bioretention swale (a.k.a. bioswale) proposed for the South 223rd Street corridor is illustrated by the conceptual graphics at right, and the overall dimensions associated with the proposed facility are described below:

- Footprint = 16'W x 300'L (overall)
- Channel Depth = 1.75' - 2.25'
- Total Depth = 5' - 5.5'
- Maximum Ponding Depth = 1.25'
- Treatment Capacity = 91% Total Runoff Volume (Full Treatment)

The 300' length and 16' width total bioswale area will be divided into multiple bioswale segments, block by block and along both sides of South 223rd Street. Detailed design calculations may be found in the Conceptual Technical Information Report (TIR) located in Appendix E.

It should be noted that the proposed channel and ponding depths exceed typical values for bioswales. To ensure pedestrian safety, fall protection (safety railings) may be required.

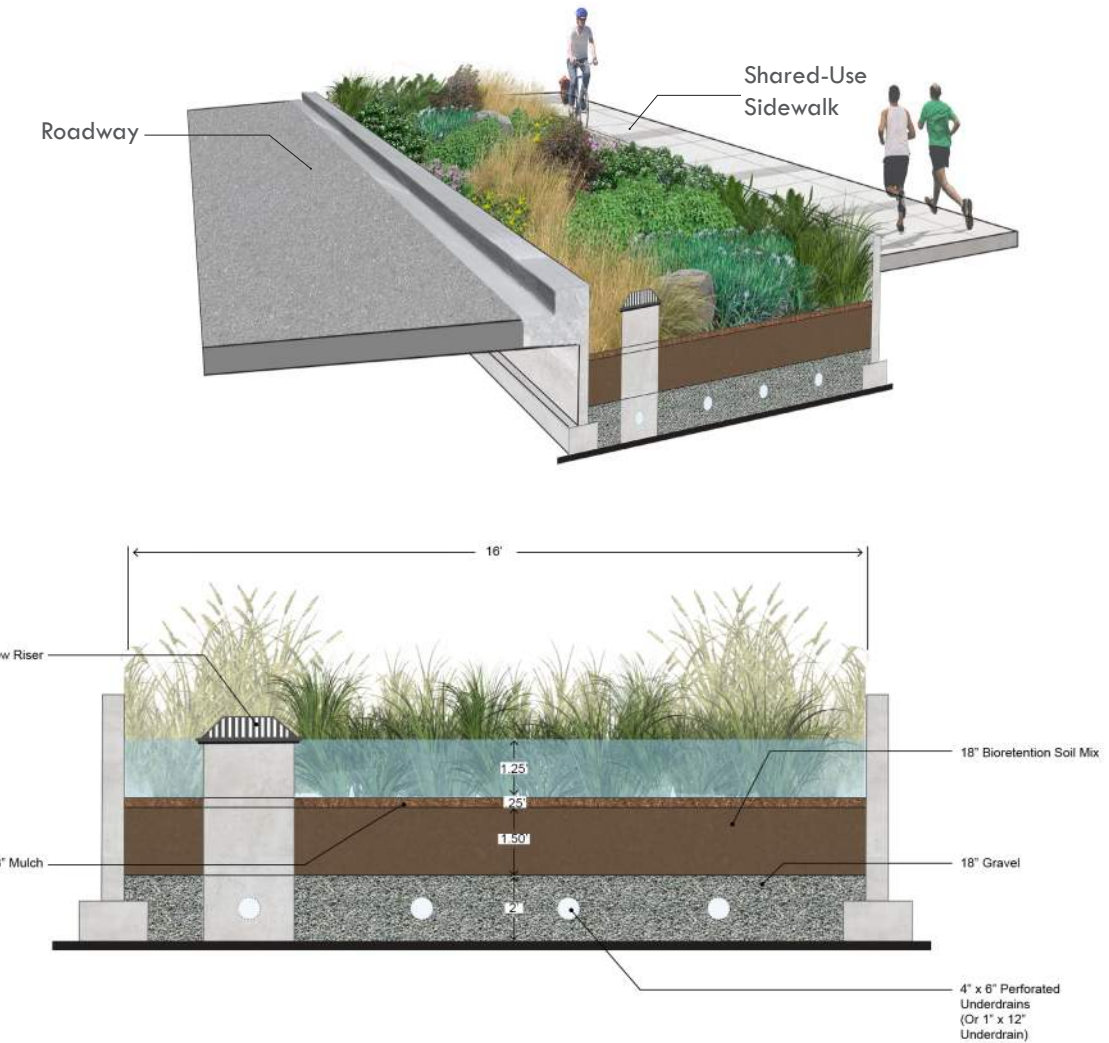


Figure: Proposed Bioretention Swale

UTILITY CONSIDERATIONS

Aerial Utilities

To address project goals and the aesthetic vision desired by the City, the existing aerial utilities are proposed to be relocated to underground facilities. Utilities along this corridor include the following: Puget Sound Energy, Comcast, Zayo Fiber Optic, Lumen, and potentially other internet and communication providers. These facilities would be located in an underground duct bank along the southern right of way line. There is space within the existing right-of-way for these underground facilities. The exact alignment and depth will need to be coordinated with the other proposed utility upgrades.

Existing Water, Sewer, Gas, and Drainage Utilities

The water system is owned and maintained by King County Water District 54. Initial research does not indicate any Water District Capital projects within the South 223rd Street project area. During final design, meter replacement and main relocation coordination with the District will be required.

Recently, the District has been increasing the pipe sizes to encourage the Downtown Des Moines area to grow to multifamily and encourage commercial development. Originally, the District had one wood stave water tank across the street from the existing office at 922 South 219th Street. In 1969, the 250,000 gallon blue steel reservoir was constructed at its current location at 21810 South 11th Avenue South. In 2004, the District completed the 660,000 gallon concrete reservoir at the same site to accommodate future growth and provide increased fire flow. (Source: <https://kcwd54.org/2146/History>)

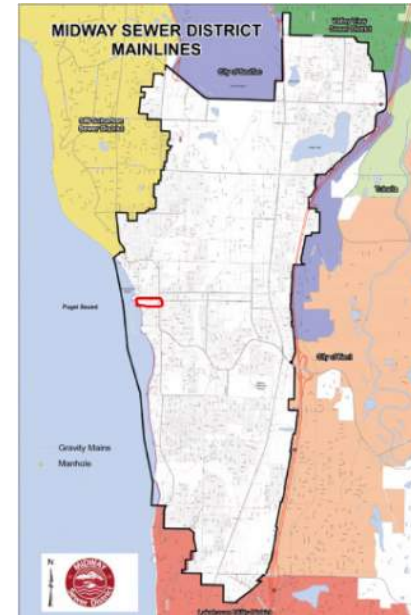
The sewer system is owned and maintained by Midway Sewer District. Improvements are not anticipated to affect their facilities. However, as final design progresses, coordination will be important to minimize sewer service impacts.

The PSE gas utility is also within the project limits. Undergrounding the aerial facilities and the new drainage system will likely require close coordination and potential relocation of gas utilities within the project limits.

The drainage system will undergo a complete reconstruction to achieve the desired project goals. This is described in the preceding sections.



Water District 54 Service Area, project area highlighted in red



Midway Sewer District, project area highlighted in red

UTILITY CONSIDERATIONS



Utility undergrounding completed in Des Moines Theater alley at S 223rd St.



Overhead utility lines at S 223rd St and 6th Ave S intersection



Overhead utility lines just east of S 223rd St and 7th Ave S intersection



Overhead utility lines at Overlook I Park

DESIGN PRINCIPLES

The following criteria were identified as design principles that support a pedestrian-friendly downtown streetscape design.

Roadway Classification

The existing average daily traffic (ADT) is unknown for this section of South 223rd Street, however the City of Des Moines classifies South 223rd Street as a Neighborhood Collector. Based on this designation, we would expect typical volumes between 1000 – 3000 vehicles per day. For the design of South 223rd Street, the design principles for Urban Collector, as outlined in ITE's Urban Street Geometric Design Handbook, are used because they are appropriate for creating pedestrian-friendly downtown streets. **Note:** The Washington State Department of Transportation has classified one block of the study area (7th Avenue S to Marine View Drive) as an Urban Major Collector. This is likely due to this one block connecting two parallel arterials.

Design Vehicle

The design vehicle for this corridor's design layout is the Single Unit (SU) Truck (essentially a UPS delivery truck). This vehicle size is the appropriate design vehicle for designing pedestrian-friendly downtown streets.

Roadway Geometry

The horizontal alignment of South 223rd Street is designed in a curvilinear geometry, connecting Marine View Drive and Cliff Avenue South. The radii between intersections varies between 200' and 250', exceeding the minimum horizontal curve requirements for a posted speed limit of 25 mph as documented by AASHTO and ITE. This curvilinear geometry also provides subtle traffic calming that supports a pedestrian-friendly environment and balances stormwater infrastructure on both sides.

Intersection Geometry

The intersection lane alignments are parallel with no skew across the intersections. All corners have 25' radii and are designed to accommodate the SU design vehicle. The intersections will be raised to provide maximum ADA compliance, allowing the crosswalks to match the grade of sidewalks without ramps and landings.

Roadway Cross Section

The general cross section of this corridor will include the following: two 12' vehicle travel lanes, 8' wide parallel parking on both sides of street for a portion of the roadway, 20' wide angle parking on one side of street for another portion, a minimum 4' buffer for pedestrians from the travel lane, and a minimum 10' wide shared-use sidewalk on both sides. The cross sections will follow the existing roadway vertical profile of 3%-10% slope.

Downtown Context-Sensitive Design Considerations

Given the corridor's physical location within the Marina District, other factors considered in developing the design include the following:

- Pedestrian and bicycle safety, comfort, and connectivity
- Connection to the Marina Steps
- Connection to neighborhoods east of Marine View Drive and along each north-south street
- Connection to housing, adjacent businesses, and related services
- On-street parking where appropriate for businesses, residents, and visitors, balanced with space for regional stormwater facilities
- Consideration of how future redevelopment will relate to the corridor
- Alleyway activation and connection
- Streetscape enhancements that create quality public spaces and reflect the unique identity of Des Moines
- Green stormwater infrastructure (bioswales) to reduce the amount of pollutants entering Puget Sound

DESIGN PRINCIPLES

The following high-level layout plan illustrates the proposed alignment of the roadway geometry for South 223rd Street, as well as key streetscape elements to be integrated along the corridor. The proposed layout was informed by the cultural resource survey, stormwater analysis, design principles, and City goals for the South 223rd Street corridor.

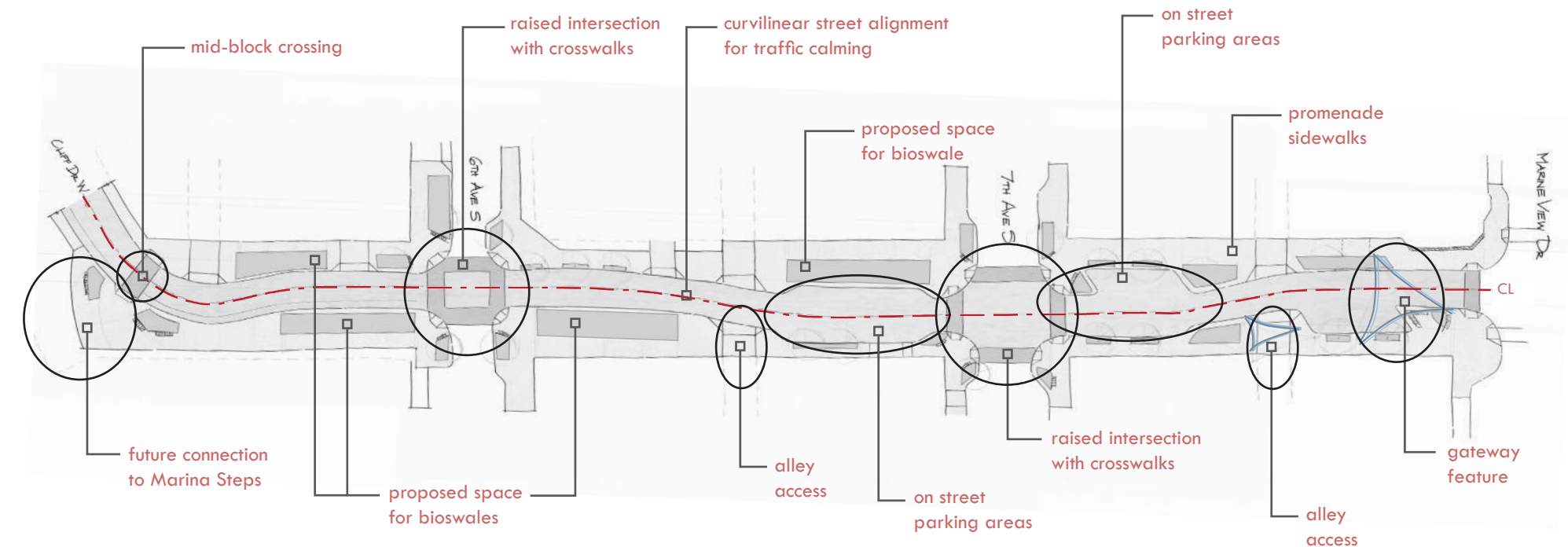


Figure: Layout plan illustrating types of streetscape elements

STREETSCAPE ELEMENTS

The proposed design for South 223rd Street would create new placemaking enhancements along the north and south sides of the street. Both sides would be improved with wider sidewalks and landscaped buffer/amenity zones to create a pedestrian promenade. On-street parking will be provided where needed and where it does not interfere with the bioswale layout. The promenade shared-use paths will connect the retail core along Marine View Drive to the Marina Steps and waterfront. Urban bioswales along the corridor form a linear stormwater park that will filter pollutants from stormwater runoff prior to reaching Puget Sound and enhance the character and pedestrian experience of the South 223rd Street corridor.



Amenity Areas

The proposed promenade incorporates “amenity areas” which could include design elements such as: pedestrian-scaled lighting, bicycle parking, benches, trash receptacles, interpretive signs, wayfinding signage, and art. Landscaping and street trees are included in this zone, and nodes can be developed to allow for outdoor dining or other programmed activities.

Buffer Areas

Provide a minimum 4’ wide buffer area that separate pedestrians on the sidewalk from moving traffic. These areas will contain street trees, lighting, and landscaped areas that include the bioswales.

On-Street Parking

Parallel or angle parking is provided where appropriate. Multiple public parking options are provided on adjacent side streets.

Landscaped Areas and Bioswales

The proposed design includes a combination of planter areas with street trees and bioswales that combine to form a linear stormwater park. These features provide environmental benefits, such as improved water and air quality, lower “urban heat island” temperatures, improved biodiversity along the corridor, and a more inviting and interesting experience for pedestrians.

Pedestrian Promenade

Create a promenade atmosphere integrating the buffer, amenity and walkway areas into a single multi-modal element. This concept would provide an attractive pedestrian-oriented shared use sidewalk that would serve as the primary gateway connecting Downtown to the Marina and waterfront.

Bicycle Route and Facilities

South 223rd Street is designated as a bicycle route in the Comprehensive Plan (fig 3-7) without designated bike lanes. Given the destination of the waterfront, it is envisioned that bicycle users will range from families to “road warriors.” With this range of users and abilities, the corridor design allows families to co-mingle on the promenade sidewalks as a shared use path and more confident riders can use the roadway as they see fit.

Back of Walk Areas

The area to the back of sidewalk that includes driveways, planters, utility vaults, and pedestrian pathways.

INITIAL CONCEPTUAL LAYOUT PLAN

The initial conceptual layout plan builds on the high-level alignment layout with additional streetscape elements and amenities such as pedestrian lighting, seating nodes, public art installations, planter areas, and new street trees. This initial conceptual layout was refined over the course of the project to arrive at the 10% design.

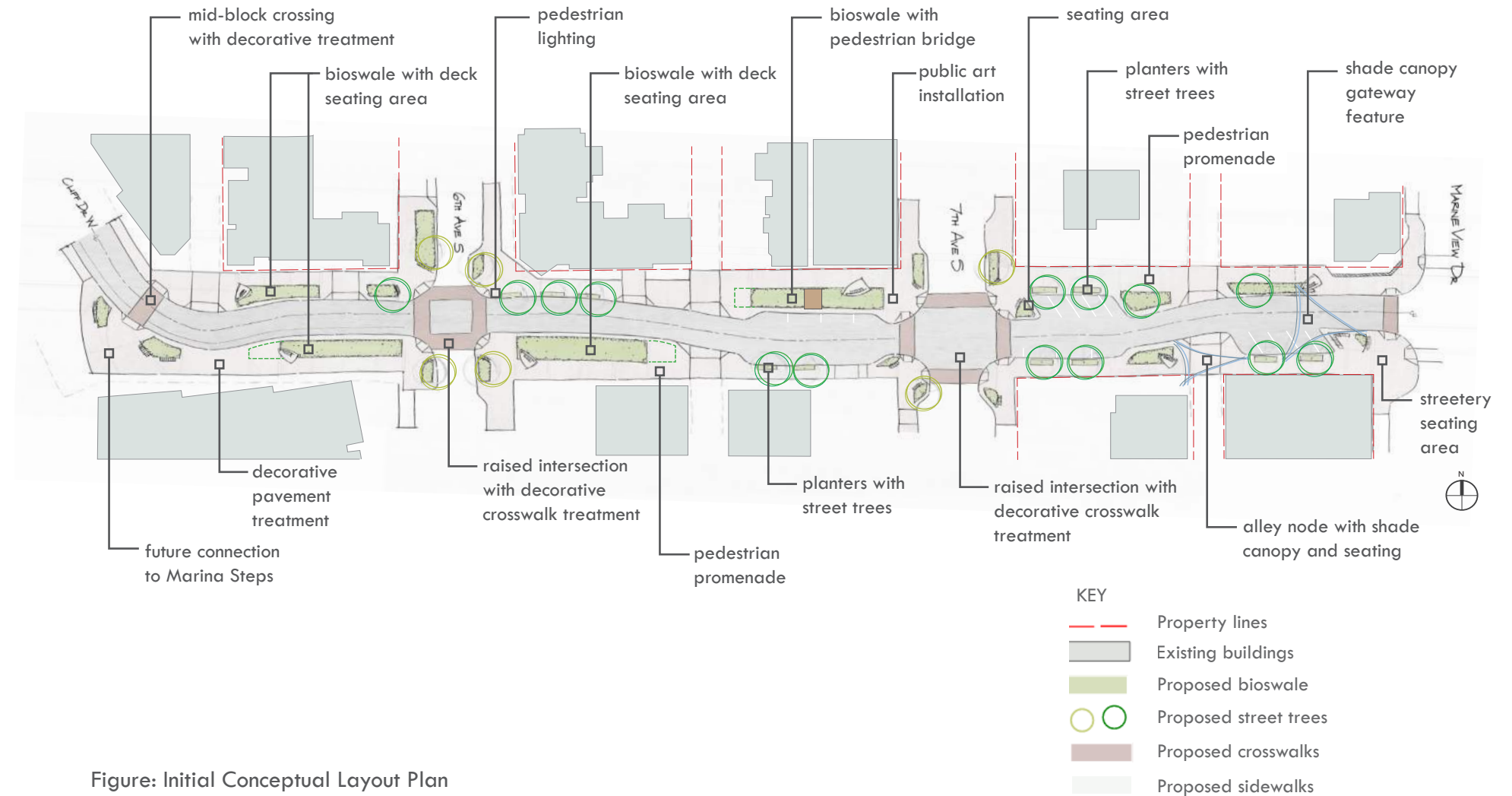


Figure: Initial Conceptual Layout Plan

CROSS SECTIONS

Sections A, B & C, show the preferred cross sections for South 223rd Street. This section fits within 80' of right of way for a two-lane roadway with 12' travel lanes, providing a minimum 10' wide shared-use sidewalk on both sides, bioswales, and on-street parking throughout the corridor. Section A represents the east end of the corridor closest to Marine View Drive and maintains existing angled parking for local businesses. Section B represents the area around the intersection with 7th Avenue South and includes limited on-street parallel parking. Section C represents the western end of the corridor where bioswales are incorporated to filter stormwater runoff from the surrounding streetscape. Overall, the South 223rd Street corridor will reflect a pedestrian-friendly place with a promenade atmosphere.

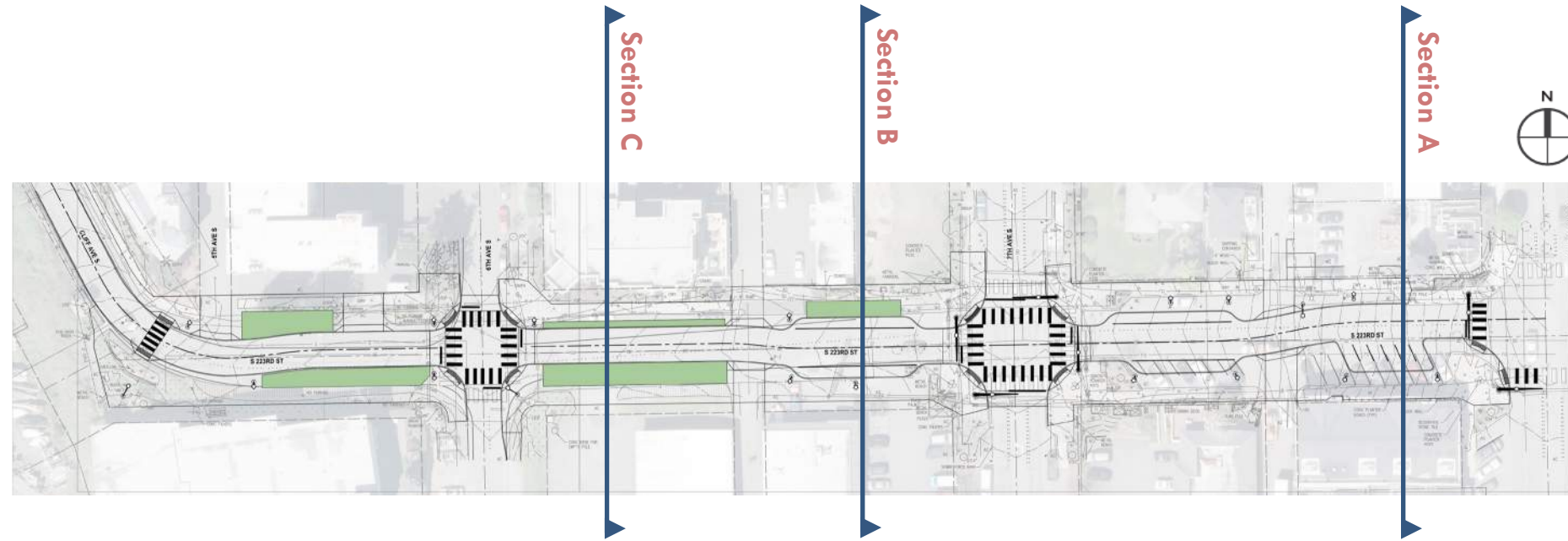
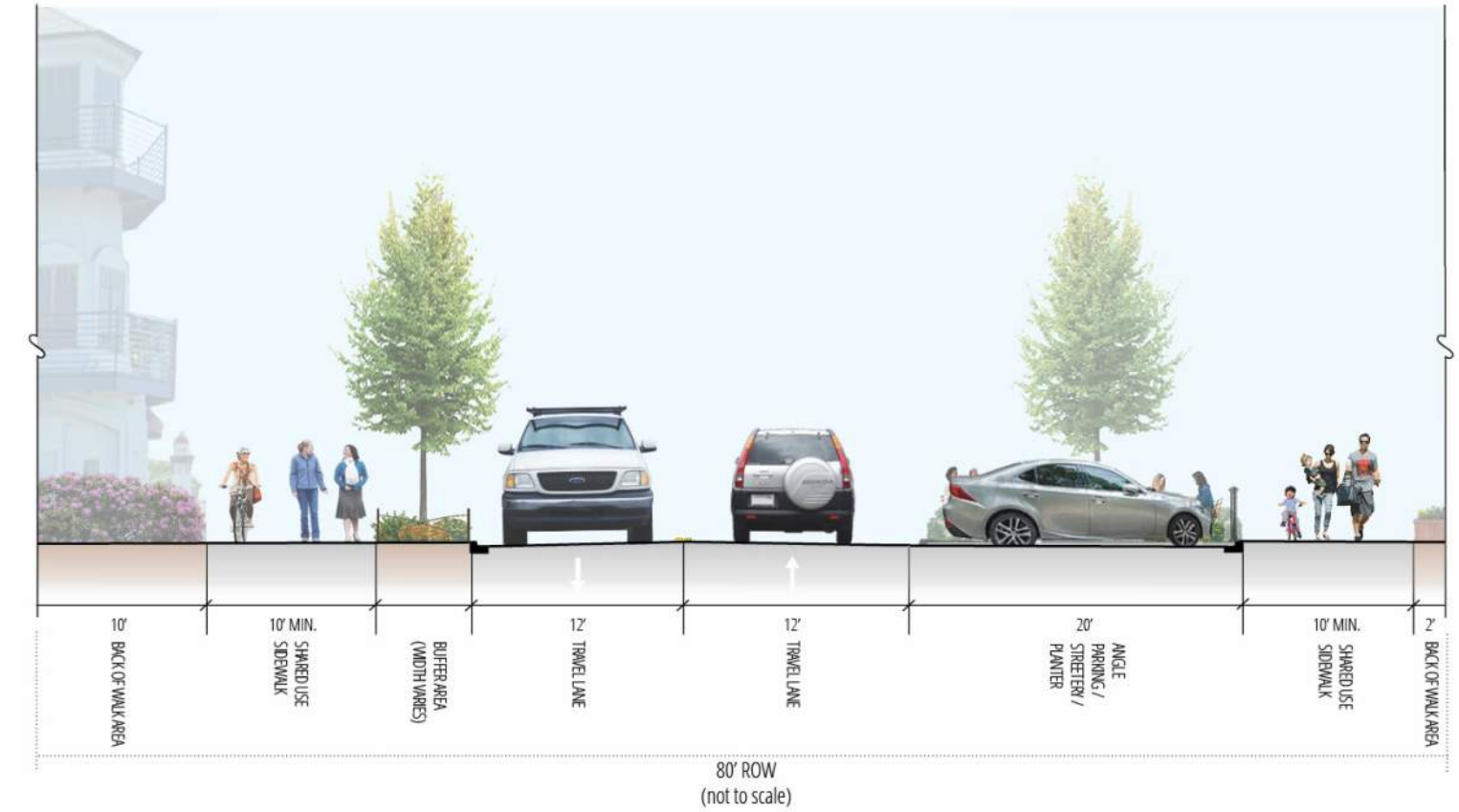


Figure: 10% Roadway Layout Plan

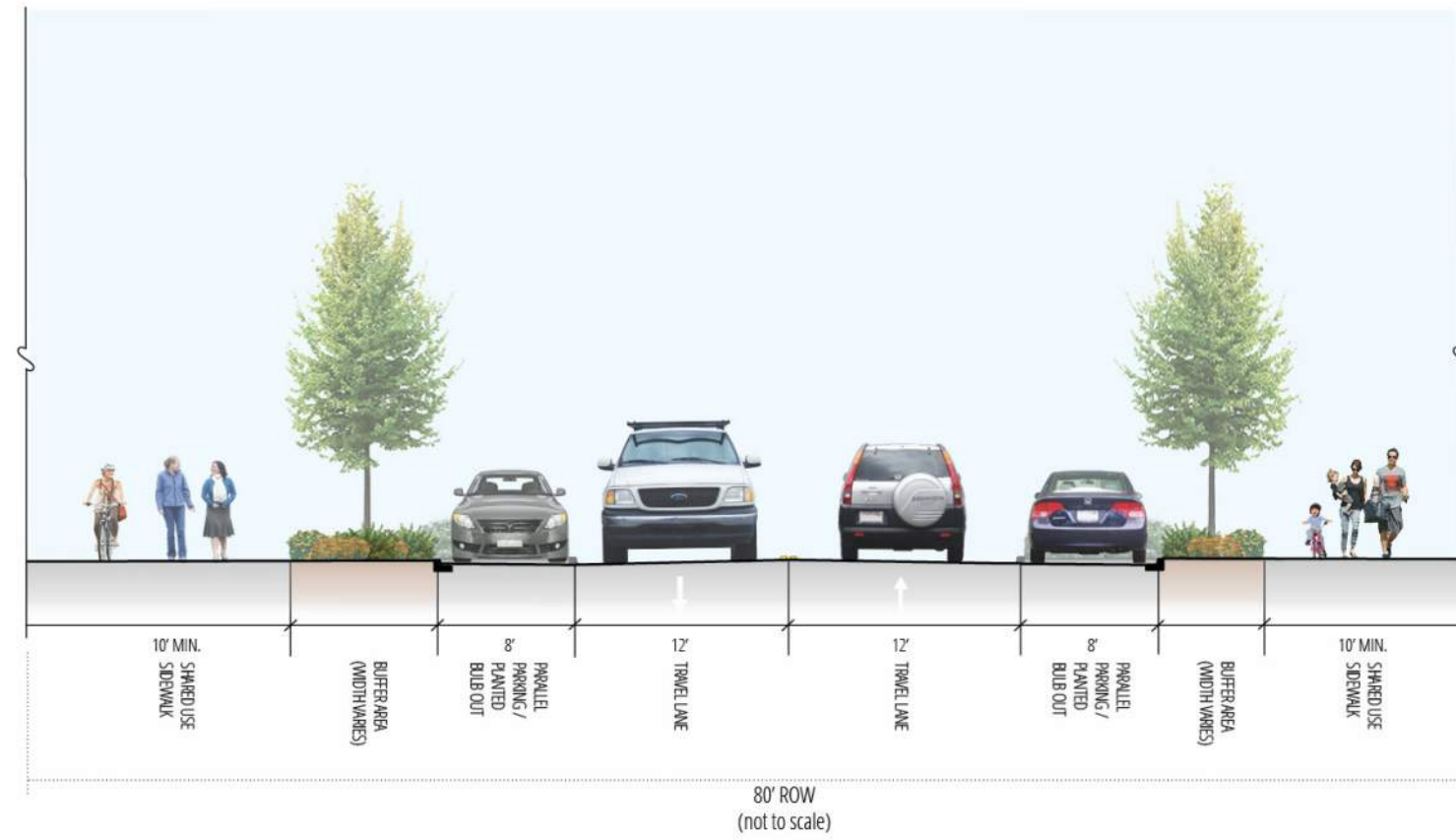
CROSS SECTIONS

Section A with Angle Parking (looking east)



CROSS SECTIONS

Section B with Parallel Parking (looking east)



CROSS SECTIONS

Section C with Bioretention Swale (looking east)



PROPOSED URBAN DESIGN THEMES

Urban Design Theme Development

As part of the corridor design, the design team developed three proposed urban design themes for the South 223rd Green Street corridor. Each theme is described in the following pages, along with inspiration images, conceptual design layouts, and potential design elements.

As part of the City's public involvement effort, these themes were brought to the community to further refine the concepts and to build community support for the South 223rd Green Street project. The final design concept may ultimately combine elements from each theme, as well as elements that tie in with the future Marina Steps.

Theme 1: Downtown Arts & Culture

With the current renovation of the Downtown Des Moines theater as a music and performing arts venue and the variety of multicultural dining options in the Downtown area representing the diversity of the Des Moines community, this concept expands on the arts and culture theme with a vibrant palette that is warm and engaging.

Inspirational images

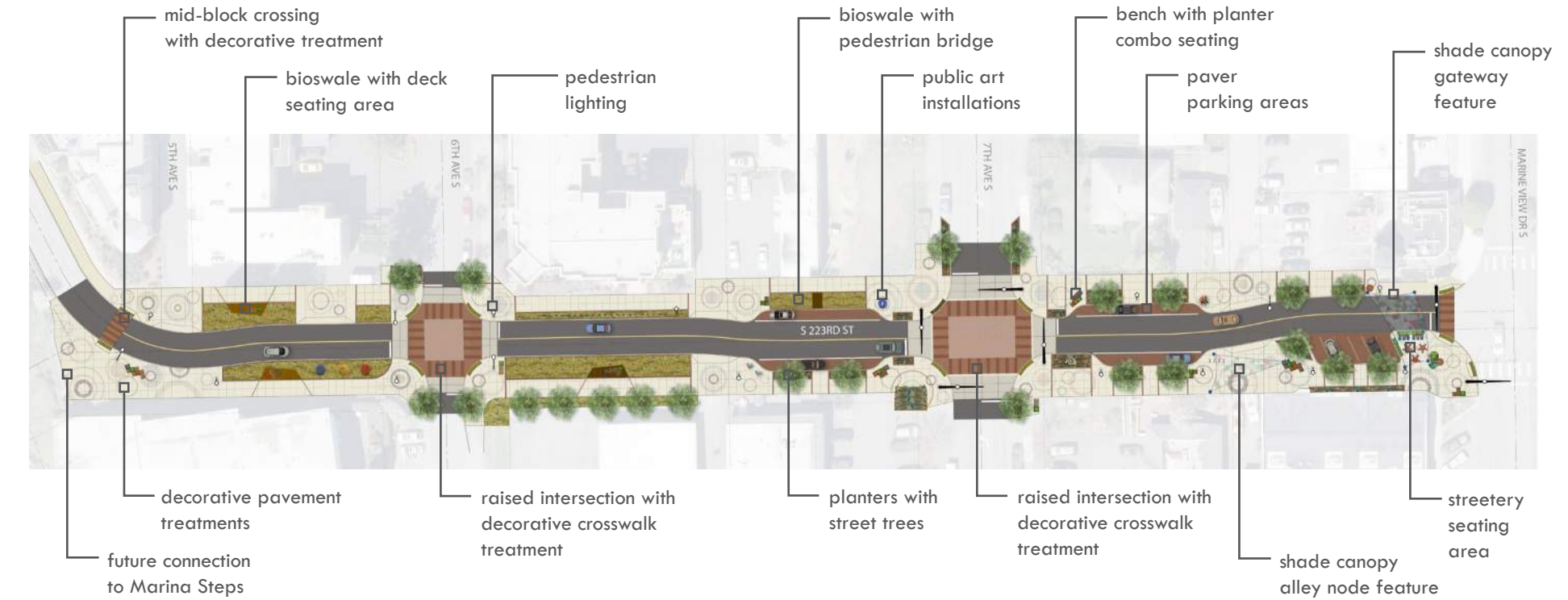


arts inspired
vibrant color palette
playful
engaging



PROPOSED URBAN DESIGN THEMES

Urban Design Theme 1: Downtown Arts & Culture



NORTH

PROPOSED URBAN DESIGN THEMES

Urban Design Theme 1: Downtown Arts & Culture



PROPOSED URBAN DESIGN THEMES

Downtown Arts & Culture | FEATURES + AMENITIES



Bench with planter combo



Decorative paver accent bands



Decorative crosswalk treatment



Shade canopy feature



Mosaic pavement accents



Deck seating area over bioswale



Placemaking elements

PROPOSED URBAN DESIGN THEMES

Theme 2: Waterland City

Inspired by the Des Moines “Waterland City” motto and existing urban design elements along the South 216th Street corridor and the recently constructed Marina bulkhead, this concept uses a cool color palette and marine motif to emphasize the South 223rd Street connection to the Marina and Puget Sound.



marine inspired
cool color palette
inviting
relaxing

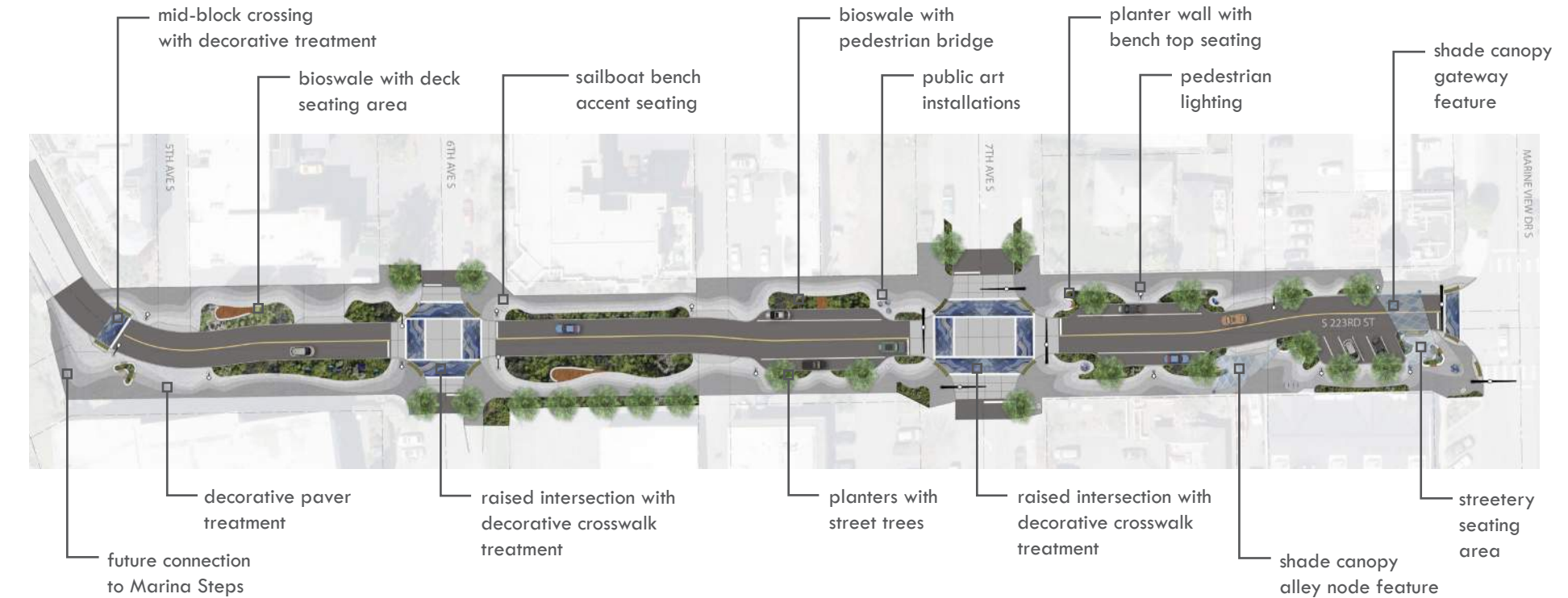


Inspirational images



PROPOSED URBAN DESIGN THEMES

Urban Design Theme 2: Waterland City



NORTH

PROPOSED URBAN DESIGN THEMES

Urban Design Theme 2: Waterland City



PROPOSED URBAN DESIGN THEMES

Waterland City | FEATURES + AMENITIES



Decorative cement paver treatment



Planter wall with bench top seating



Decorative mosaic crosswalk treatment



Cast concrete accent seating



Bike rack



Shade canopy feature



Pedestrian bridge over bioswale



Tie in with existing Des Moines wayfinding + banners



Accent lighting

PROPOSED URBAN DESIGN THEMES

Theme 3: Contemporary Pacific Northwest

Interpreting the Pacific Northwest coastal theme with a contemporary Downtown flair, this concept utilizes natural materials and nature-inspired art elements to reflect the local geography and character of Des Moines' Puget Sound location.



PNW inspired
neutral color palette
welcoming
natural

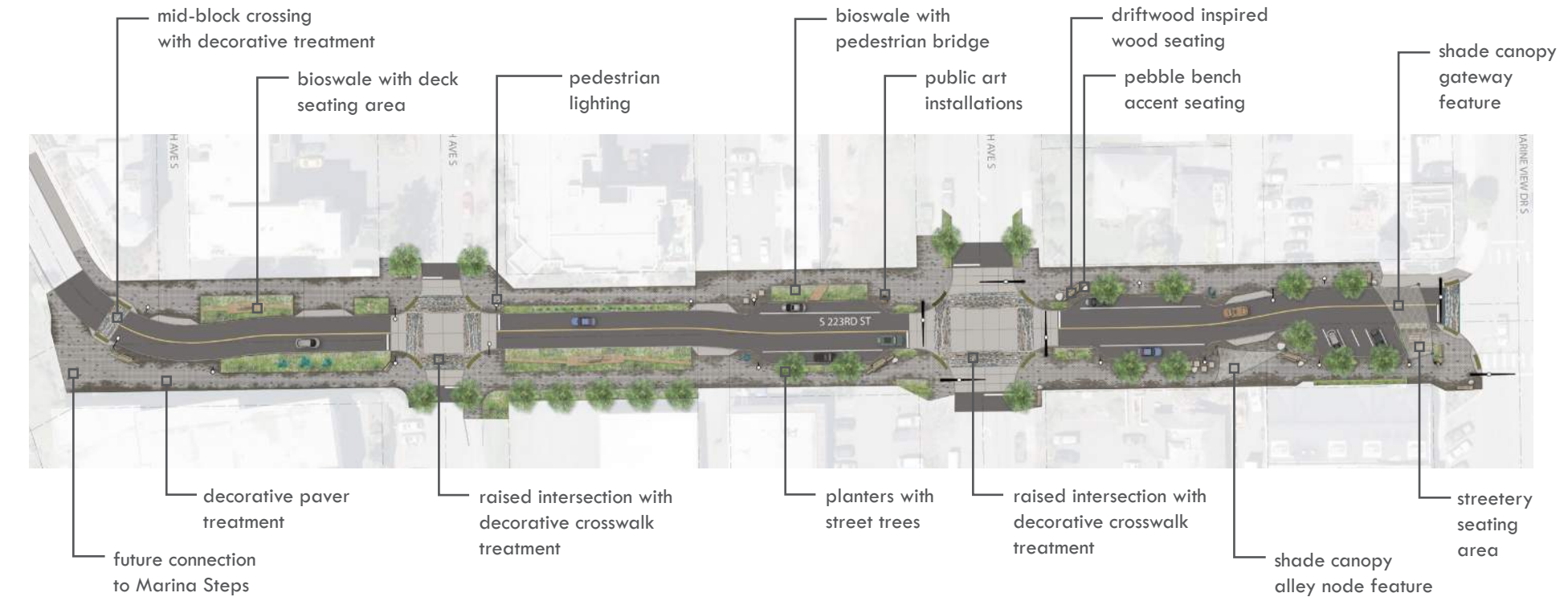


Inspirational images



PROPOSED URBAN DESIGN THEMES

Urban Design Theme 3: Contemporary Pacific Northwest



NORTH

PROPOSED URBAN DESIGN THEMES

Urban Design Theme 3: Contemporary Pacific Northwest



PROPOSED URBAN DESIGN THEMES

Contemporary Pacific Northwest | FEATURES + AMENITIES



Decorative permeable cement concrete pavers



Drifter structure seating (sizes vary)



Pebble precast seating



Shade canopy feature



Plank pathway over bioswale



Wayfinding kiosk



Accent lighting

GREEN STREET DESIGN

Creating a Green Street

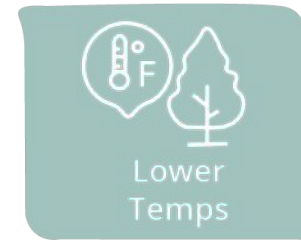
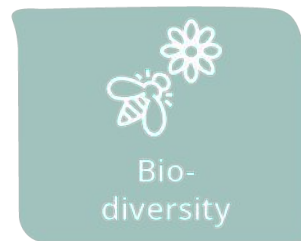
With the addition of street trees, generous planting areas, and a series of vegetated bioswales to filter stormwater runoff, the South 223rd Street corridor will be transformed into a “green street” and linear stormwater park. This will reduce the amount of pollutants entering into Puget Sound via stormwater runoff, as well as provide numerous benefits to the community. Green street benefits to the local community include:

- Cleaner local waters through biofiltration of stormwater runoff
- Improved air quality with the addition of street trees and plant material
- Lower street temperatures during hot periods, reducing the “urban heat island” effect
- Enhanced biodiversity along the corridor with the addition of native and pollinator-friendly plantings
- A more inviting pedestrian experience for residents and visitors
- Incentives for economic development and investment



Example of a green street promenade from the Grey to Green initiative in Sheffield, UK

Benefits of a Green Street



GREEN STREET DESIGN

South 223rd Street as a Linear Stormwater Park

According to the Washington State Department of Ecology, stormwater runoff is the greatest source of toxic pollutants in Puget Sound (<https://ecology.wa.gov/water-shorelines/puget-sound/issues-problems/toxic-chemicals>). Rainwater washes pollutants from roads, roofs, sidewalks, parking lots, and other impermeable surfaces into storm drains and is then discharged via stormwater systems into Puget Sound.

Green stormwater infrastructure, such as bioswales, uses soils and plant material to channel stormwater runoff and filter pollutants from the stormwater before it is safely discharged into Puget Sound. Green stormwater infrastructure can be combined with recreational amenities to form stormwater parks that are beneficial to both the environment and local communities. Per the Puget Sound Regional Council, some of the benefits of stormwater parks include:

- Resilience to climate change by increasing green space and stormwater management
- Improved water quality and fish habitat, which benefits Puget Sound ecosystems
- Educational opportunities on protecting water quality, local habitats, and other environmental issues
- Recreational amenities with added green space, seating areas, and public art

The proposed layout design for South 223rd Street effectively creates a linear stormwater park along the corridor with a series of connected bioswales combined with added public amenities such as seating areas, art installations, pedestrian lighting, and interpretive signage.



Mission Creek Stormwater Park in San Francisco, CA is an example of a linear urban stormwater park

GREEN STREET DESIGN

Bioswales

The series of linked bioswales along the South 223rd Street corridor will function as both green stormwater infrastructure, filtering runoff before it enters Puget Sound, and a featured landscape design element. Through these bioswales, the City of Des Moines will be able to treat runoff from the South 223rd Street project area, as well as an additional 29.58 acres of the North Downtown Basin, while also adding interest and natural character to the streetscape.

The planting palette for the bioswales will be chosen based on several key characteristics:

- Ability to withstand flow velocity during storm events / rainy season
- Drought tolerance during summer months with lower precipitation
- Aesthetic appearance to enhance the character of the streetscape
- Pollinator-friendly plants to support local biodiversity
- Emphasis on Pacific Northwest native plants
- Ease of on-going maintenance



Interpretive Signage



Examples of interpretive signage



Interpretive signage will be added to the bioswales along the South 223rd Street corridor to educate the public about how they work, as well as their many environmental benefits.

GREEN STREET DESIGN

Sample Urban Bioswale Palette



Spiraea betulifolia var. *lucida* / Birchleaf Spirea



Cornus sanguinea 'Arctic Sun' / Arctic Sun Yellow Twig Dogwood



Juncus tenuis 'Blue Dart' / Blue Dart Rush



Carex glauca / Blue Sedge



Iris douglasiana / Douglas Iris

Street Tree Selections

Street trees for the South 223rd Street corridor will be chosen from the City of Des Moines' list of approved street trees and with consideration for maintaining views to the waterfront, while also adding seasonal interest and character.



Carpinus caroliniana 'Uxbridge' / Rising Fire American Hornbeam



Acer griseum 'Molly Fordham' / Cinnamon Girl Maple



Prunus sargentii 'Columnaris' / Columnar Cherry

Planter Area Palette

The palette for the planter areas along South 223rd Street will be tailored to coordinate with the final conceptual design theme that is ultimately selected for the corridor.



Downtown Arts - warmer tone planting palette



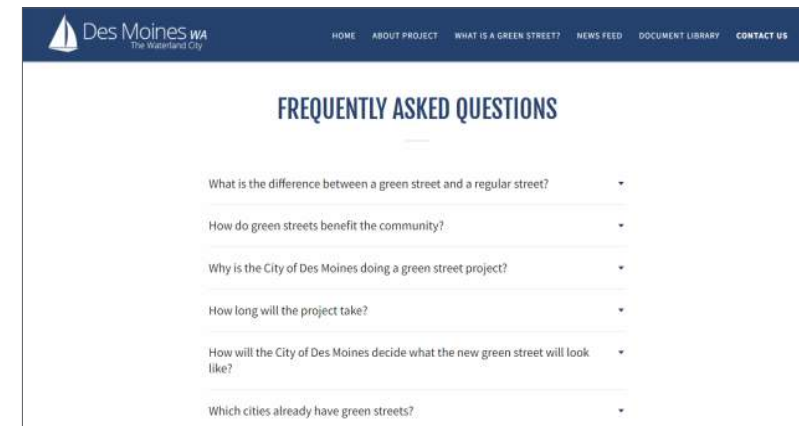
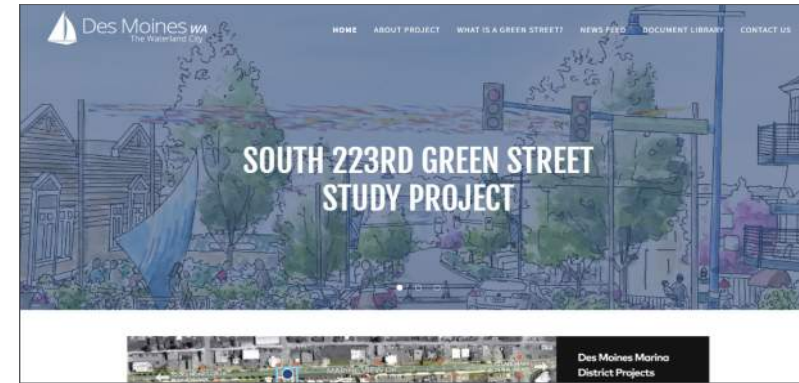
Waterland City - cooler tone planting palette



Contemporary PNW - coastal planting palette

PUBLIC OUTREACH

Public involvement is important to the success of the project, and the City of Des Moines worked with the community to receive input on the preliminary design themes for South 223rd Street. In order to reach a broader audience throughout the community, the City initiated their public outreach through many online solicitations via the City’s social media and a project web site designed to share project information and gather project feedback. A public survey was launched in late fall 2023 to ensure the Des Moines community would have the opportunity to review and provide feedback on the preliminary concepts. Further public outreach activities will be conducted in later project phases as the preliminary concepts are refined and the project moves closer to a final design.



Web site excerpts

Project Web Site (www.desmoinesgreenstreet.com)

A dedicated web site has been launched for the South 223rd Green Street Study Project in order to provide the community with up-to-date project information including the project background, goals, schedule, progress updates, preliminary conceptual designs, FAQs, and contact information. The web site will be updated regularly as the project progresses and will serve as the primary resource for the community to find information on the project’s progress and related documents.

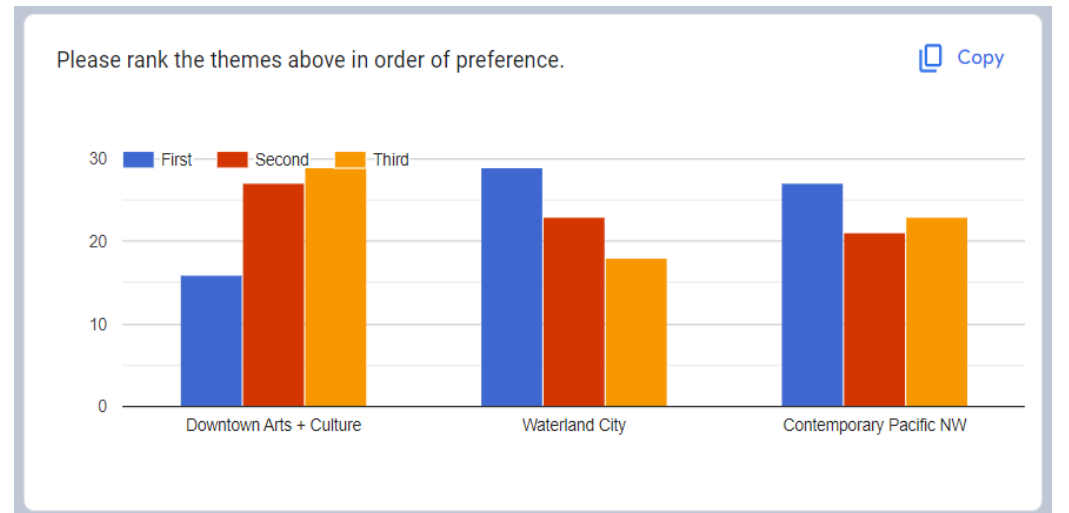
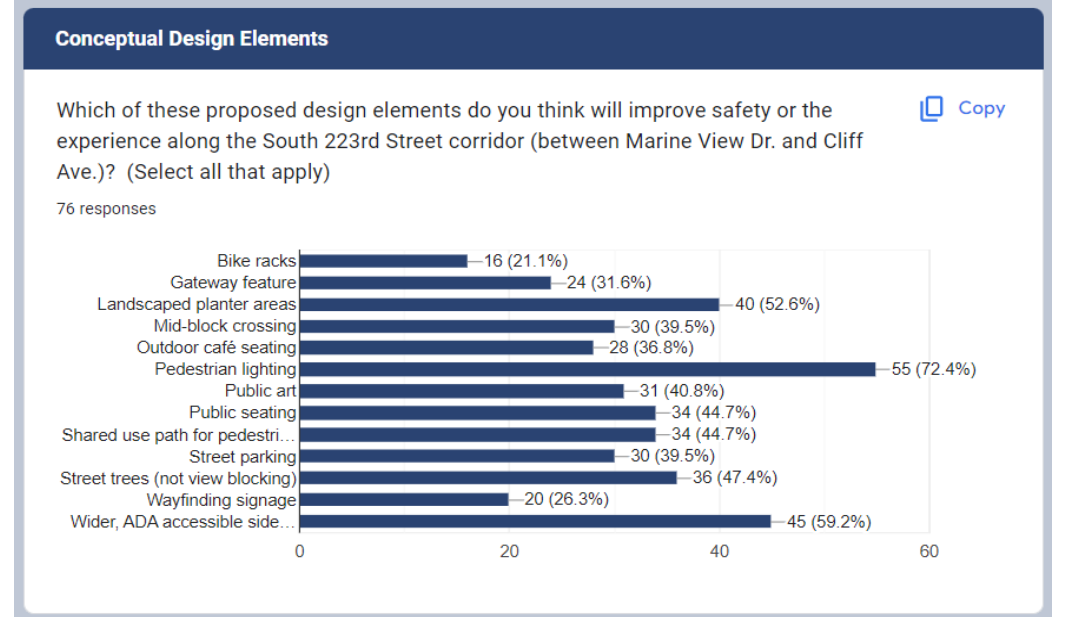
PUBLIC OUTREACH

Online Survey

As described previously in the report, the initial phase of the South 223rd Street study includes the development of three preliminary conceptual design options for the “look and feel” of the corridor. The City desired public involvement in prioritizing the proposed streetscape enhancements and selecting the preferred design theme that will serve as the basis for future final design of the corridor. The public engagement campaign began on November 20, 2023 with the launch of the online survey. The project and survey were promoted through the City web site, project web site, and social media updates in order to encourage engagement from a wide swath of the community.

The online survey was open for public feedback through December 11, 2023 and received a total of 79 responses. Amongst the feedback received, participants indicated that improved pedestrian lighting, wider ADA accessible sidewalks, and enhanced landscape planter areas were design elements that would most improve safety and the experience along the South 223rd Street corridor.

Participants also selected “Waterland City” as the preferred design theme, with “Contemporary Pacific Northwest” as a close second. Comments indicated that the preferred themes celebrated the unique identity of Des Moines and its Puget Sound waterfront location, as well as improved the experience and environmental aspects of the street through the enhanced planting areas and stormwater quality improvements. The complete survey results have been compiled into a Public Engagement Summary (Appendix D).



ENGINEERING OPINION OF PROBABLE CONSTRUCTION COST

The anticipated project delivery costs are outlined below. The project team considered many factors in establishing the total project budget, including funding sources, utility undergrounding and relocations, inflation for project delivery in 2030, placemaking elements, professional services, and administrative costs.



CITY OF DES MOINES
S 223RD ST ENHANCEMENT STUDY
 CLIFF DR - MARINE VIEW DRIVE



PRELIMINARY FUNDING ESTIMATE

Title: South 223rd Street Enhancement Study	Project Length (LF)	950
Location: Des Moines, WA	Project Area (SF)	76,500

CONSTRUCTION COST ESTIMATE

Description	Quantity	Unit	Unit Cost	Total
1 Mobilization (8% of Const Subtotal)	1	LS	\$ 534,492.00	\$ 534,492.00
2 Construction Surveying (1.5% of Const Subtotal)	1	LS	\$ 100,217.00	\$ 100,217.00
3 Project Temporary Traffic Control (High - 8% Const Subtotal)	1	LS	\$ 534,492.00	\$ 534,492.00
4 Earthwork - Medium (1' to 4' depth)	76,500	SF*	\$ 3.00	\$ 229,500.00
5 Removals	76,500	SF*	\$ 4.00	\$ 306,000.00
6 Roadway Improvements incl. Excavation - Arterial, (width = 80')	76,500	SF	\$ 15.00	\$ 1,147,500.00
7 Concrete Sidewalk	5,278	SY	\$ 95.00	\$ 501,388.89
8 Concrete Curb & Gutter	2,375	LF	\$ 45.00	\$ 106,875.00
9 Planter Strip	1,689	SY	\$ 55.00	\$ 92,888.89
10 Decorative Lighting (Des Moines Standard)	950	LF	\$ 450.00	\$ 427,500.00
11 Landscaping & Restoration - Complex	1,900	LF	\$ 90.00	\$ 171,000.00
12 Traffic Signal - Partial, (new/replacement)	1	EA	\$ 250,000.00	\$ 250,000.00
13 Miscellaneous Utilities	76,500	SF*	\$ 1.25	\$ 95,625.00
14 Temporary Erosion/Water Pollution Control	76,500	SF*	\$ 2.00	\$ 153,000.00
15 Storm Drainage - New	950	LF	\$ 150.00	\$ 142,500.00
16 Storm Water Treatment System (Alt 3)	76,500	SF*	\$ 7.00	\$ 535,500.00
17 Storm Water Flow Control (Alt 3)	76,500	SF*	\$ 2.50	\$ 191,250.00
18 Stormwater LID (Alt 3)	76,500	SF	\$ 5.00	\$ 382,500.00
19 Water Main Improvements (width=5') - Adjust	475	LF	\$ 150.00	\$ 71,250.00
20 Utility Undergrounding (7th to Cliff Dr)	550	LF	\$ 1,100.00	\$ 605,000.00
21 Sewer Main Improvements (width=5') - Adjust	475	LF	\$ 125.00	\$ 59,375.00
22 Urban Design Features	950	LF	\$ 750.00	\$ 712,500.00
23 Gateway Features	1	LS	\$ 500,000.00	\$ 500,000.00

Subtotal Cost \$ 7,850,353.78
 30% Contingency \$ 2,355,106.13

TOTAL CONSTRUCTION COST (2024) \$ 10,205,459.91

* NOTE: (SF) based on proposed widened area

ENGINEERING OPINION OF PROBABLE CONSTRUCTION COST

RIGHT OF WAY COST ESTIMATE

Description	Quantity	Unit	Unit Cost*	Total
ROW - Residential	0	SF	\$ 20.00	\$ -
ROW - Commercial	1000	SF	\$ 125.00	\$ 125,000.00
Construction Easement	6	EA	\$ 2,500.00	\$ 15,000.00
R.O.W. Administration (20% of subtotal)	1	LS	\$ 28,000.00	\$ 28,000.00
TOTAL RIGHT OF WAY COST			\$	\$ 168,000.00

ENGINEERING / MANAGEMENT FEE

(Preliminary, Design, Survey, and Inspection)

	Total
Preliminary, Design, Survey (15%)	\$ 1,530,818.99
Constr. Eng., Admin. and Inspection (15%)	\$ 1,530,818.99
City Admin (from City's project description sheet)	\$ -
TOTAL ENGINEERING / MANAGEMENT COST	\$ 3,061,637.97

PROJECT COST SUMMARY

CONSTRUCTION COST	\$ 10,205,459.91
RIGHT OF WAY COST	\$ 168,000.00
ENGINEERING / MANAGEMENT COST	\$ 3,061,637.97
SUBTOTAL OF PROJECT COSTS (2024)	\$ 13,435,097.88
6 Year Inflation Projection (3.5% per year)	\$ 3,080,067.75
TOTAL PROJECT COST (2030)	\$ 16,515,165.63

TOTAL PROJECT COST (with Federal Funding; 120%) \$ 19,818,198.76

Assumptions

- Landscape / Restoration - Basic = 3" bark mulch or hydroseed
- Landscape / Restoration - Complex = Basic + Shrubs & Trees + Fences
- 'Concrete Sidewalk' includes driveway entrances and curb ramps
- For Federally Funded projects, add 20% for Administration fees

FUNDING OPPORTUNITIES

Stormwater Funding General Information:

Funding assistance is often available for projects that improve water quality, climate resilience, and/or provide support for municipalities that are required to meet non-point source control elements of NPDES Municipal Stormwater Permits. Assistance is typically provided in the form of a grant, low interest loan, or technical assistance. These programs have recurring funding cycles during which time an applicant submits project information, the organization providing the funding assistance reviews and prioritizes applications and awards, the final list of awarded projects is produced, and contracts are entered that track the project's completion and compliance with conditions of the grant or loan program.

Project Stormwater Features:

The South 223rd Green Street project is a capital improvement project that will implement the following features to improve stormwater and climate resilience:

- Create a linear *stormwater park*¹ setting to provide enhanced water quality treatment for existing and redeveloped public and private properties within the North Marine District of Des Moines
- Increase stormwater flow attenuation and evapotranspiration

- Demonstrate and use low impact development (LID) and green stormwater infrastructure (GSI) practices to improve quality of stormwater discharges from an urban basin to Puget Sound
- Reduce pollutant loadings to Puget Sound², including but not limited to:
 - Copper
 - Zinc
 - Lead
 - Solids and particulates
 - Trash and debris
 - Other compounds harmful to aquatic life such as oil, grease, metals, and 6PPD-quinone³
- Reduce temperature of stormwater runoff
- Design to latest King County standards for BMP design of bioretention swale system

³ N-(1,3-Dimethylbutyl)-N'-phenyl-p-phenylenediamine-quinone (6PPD-quinone) is a rubber tire oxidation product found in road stormwater runoff. Research shows it to be highly and acutely toxic to selected salmonids including coho salmon, brook trout, and rainbow trout. Reference: *Environmental Occurrence and Toxicity of 6PPD Quinone, an Emerging Tire Rubber-Derived Chemical: A Review* | *Environmental Science & Technology Letters* (acs.org)

¹ Stormwater parks enhance communities by treating stormwater and providing recreational opportunities. Puget Sound Regional Council was awarded a Puget Sound National Estuary Program grant to help catalyze the development of new stormwater parks. Stormwater parks are community facilities that both manage stormwater from a larger area (regional stormwater facility) and provide recreational opportunities (parks, trails, open space, community gardens, etc.). Reference: *Stormwater Parks* | *Puget Sound Regional Council* (psrc.org)

² See the pollutant loading calculations in the stormwater section of the design report for more detailed data pertaining to anticipated pollutant load reductions predicted for the proposed green street.

FUNDING OPPORTUNITIES

Funding Source Review:

With these project elements in consideration, KPG Psomas reviewed and compiled information about stormwater related funding opportunities that could apply to the project. In the Puget Sound region of Washington State, funding programs are focused on wastewater system improvements (these do not apply for the South 223rd Street project), stormwater quality and flow reduction, stormwater parks, stormwater non-point programs (such as inspection, maintenance, basin planning, and education), surface water restoration, and Puget Sound initiatives for habitat and water quality. The programs that are most applicable to the South 223rd Green Street project are those that recognize improvements to stormwater quality, reduction in stormwater flows, management of runoff from existing hard surfaces, creation of stormwater parks, and public education.

Our review included websites of Washington State resource agencies, King County, US EPA, US NRCS, USACE, and FHWA. We initially identified five funding programs that could apply to the project (see Summary Table in Appendix C for more detailed information):

- **Puget Sound National Estuary Program Stormwater Strategic Initiative Leads.** There are three main categories of funding for which South 223rd Street could be eligible – Stormwater Strategic Initiative, Benthic Index of Biotic Integrity (BIBI), and Toxics in Fish (TIF). Within these overall categories, South 223rd could gain National Estuary Program investment targeting Climate Resiliency in Stormwater Management, and Accelerate the Distribution and Effectiveness of Stormwater Parks. Recent funding indicates potential for \$250,000 per award out of \$1 million total.
- **Ecology Water Quality Combined Funding (WQCF).** In this program, a single application is reviewed for funding from multiple other sources (5 sources at the time of this report). Funding consists

of loans and/or grants. Stormwater facilities are eligible, including land acquisition, design, and construction funding.

- **Ecology Stormwater Capacity Grants.** This program is to support NPDES Municipal Stormwater Permit compliance, however capital construction projects are not eligible.
- **Ecology Grants of Regional or Statewide Significance (GROSS).** Partnerships are encouraged to address issues of common concern and to provide economies of scale. This grant is focused on non-point programs and capital construction projects are not eligible.
- **King County WaterWorks Grant Program.** This program funds a variety of stormwater related project types on a two-year cycle, including green stormwater infrastructure within the King County Wastewater Treatment Division service area. The South 223rd Green Street is not within the service area so would not be eligible.

Schedule Considerations:

Schedule considerations for the programs that are most relevant for 223rd Green Street are:

- **Puget Sound National Estuary Program Stormwater Strategic Initiative Leads.** Frequency of applications is not available. The next round starts in November 2023.⁴
- **Ecology Water Quality Combined Funding (WQCF).** Application window is annually between August and October.⁵ For applications submitted in October, work start as early as July of the following year and no later than April approximately 24 months later. For example, for October 2024 applicants, if awarded then the funding agreement would be negotiated July 2025-January 2026 with work starting by April 2026, and to be completed within 5 years.

⁴ <https://pugetsoundestuary.wa.gov/stormwater-sil-rfp/>

⁵ <https://ecology.wa.gov/about-us/payments-contracts-grants/grants-loans/find-a-grant-or-loan/water-quality-combined>

FUNDING OPPORTUNITIES

Permitting Requirements Related to Funding:

If the South 223rd Green Street project receives federal funding, the following permits would be required:

- NEPA CE Form
- Endangered Species Act Consultation (No Effect Letter or Biological Assessment)
- Section 106 compliance (cultural resources)

The following local permits and approvals would also be necessary:

- SEPA Checklist

The above list of permitting requirements assumes that the entire project is located outside of the 200-foot shoreline zone, that no critical areas (wetlands, streams, buffers, or geologic hazards) are present, and that no such features will be affected by the project.



Des Moines Creek at Des Moines Beach Park, Image source: City of Des Moines

NEXT STEPS

The next step for the South 223rd Green Street project is to confirm the 10% roadway layout plan with City staff in order to initiate final design of the project. With feedback from the community survey and City leadership, the project team can begin to refine and update the preliminary design. Final design will begin by developing a detailed base map for the corridor that would include all utilities, stormwater and topography with right of way, easement and property lines.

With a preliminary design in hand, the City would be eligible to apply for state and federal grant funds for construction. This funding would allow the City to leverage its local funds to build the project. Projects that improve stormwater treatment and water quality, support multi-modal traffic, and promote urban development and growth have been recent emphasis areas for grant funds.



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APPENDIX
